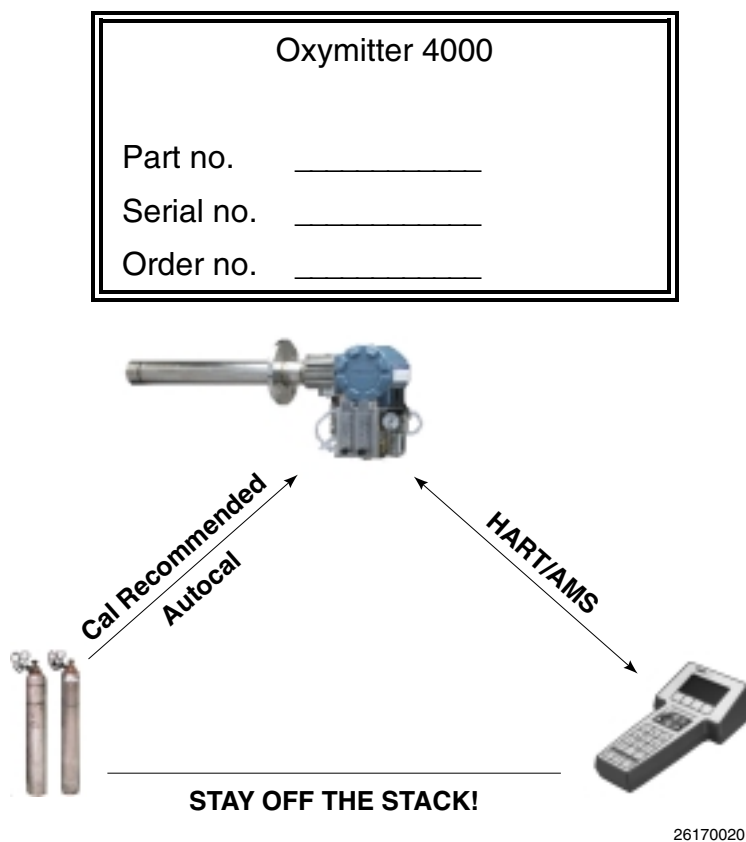


OXYMITTER 4000 OXYGEN TRANSMITTER

Instruction Bulletin IB-106-340

Revision 2.3



ROSEMOUNT[®] ANALYTICAL

FISHER-ROSEMOUNT[™] Managing The Process Better.[™]

HIGHLIGHTS OF CHANGES

Effective May, 1998 Rev. 2.0

PAGE	SUMMARY
—	Modified existing manual to accommodate integrally mounted SPS 4000 Single Probe Autocalibration Sequencer information.
—	Added locks for the electronic housing covers throughout the manual.
—	Changed test gas to calibration gas throughout the manual.
—	Changed reference gas to reference air throughout the manual.
ii	Added symbols.
Page 1-1	Added product matrix information.
Page 1-2	Indicated that heater thermocouple and diffusion element are field replaceable (paragraph 1-2.d.4).
Page 1-3	Added paragraph 1-2.d.9(c) to indicate a third method to calibrate and troubleshoot an Oxymitter 4000.
Page 1-8	Added 0 to 40% O ₂ range via HART. Added manual to calibration types. Updated signal specifications.
Pages 1-10 and 1-11	Added product matrix (Table 1-1).
Page 1-12	Added Tables 1-2, 1-3, 1-4.
Page 2-1	Deleted adapter plate disassembly recommendation from paragraph 2-1.b.2.
Page 2-7	Changed horizontal to vertical in paragraph 2-1.b.5.
Page 2-9	Added CE compliance NOTE.
Page 3-2	Added 0 to 40% O ₂ range to paragraphs 3-1.c.2 and 3-1.e.2.
Page 3-4	Expanded paragraphs 3-2, 3-2.a, and 3-2.b to further describe logic I/O. Changed 1 Kohm to 330 ohm in paragraph 3-2.a.
Pages 5-1 through 5-20	Moved TROUBLESHOOTING from Section VI to Section V.
Page 5-1	Added general troubleshooting information to paragraph 5-1. Added 4-20 mA line output information to paragraph 5-3 and Table 5-1. Added fault 14 to Table 5-1.
Page 5-7	Modified the case temperature in paragraph 5-3.f.1.
Page 5-15	Added new paragraph 5-3.n and Figure 5-14 to explain a last calibration failed indication and troubleshooting instructions.
Pages 6-1 through 6-20	Moved MAINTENANCE AND SERVICE from Section V to Section VI.
Page 6-1	Added overview paragraph 6-1. Expanded calibration paragraph (new paragraph 6-2) to include test gas checks and calibration types.
Page 6-2	Expanded calibration paragraph (new paragraph 6-2) to include calibration types.

HIGHLIGHTS OF CHANGES (Continued)

Effective May, 1998 Rev. 2.0 (Continued)

PAGE	SUMMARY
Page 6-3	Updated Figure 6-3 to include last calibration failed alarm.
Page 6-4	Added fault 14 to Table 6-1.
Page 6-13	Added NOTE to determine when to replace the diffusion element.
Page 7-3	Added NOTE concerning HART Communicator warmup period. Identified logic I/O defaults in Table 7-1.
Pages 7-4, 7-5, and 7-6	Modified HART menu tree (Figure 7-3).
Page 7-7	Added WARNING about removing the Oxymitter 4000 from any automatic control loops prior to performing a calibration.
Page 7-8	Added paragraph 7-8 to explain the procedure to enter a timed calibration via HART.
Page 9-1	Updated European address.
Pages 10-1 through 10-3	Added Section 10, Optional Accessories.

Effective Oct., 1998 Rev. 2.1

PAGE	SUMMARY
xvi through xx	Added Material Safety Data Sheets.
Page 1-4	Changed source of instrument air from required to optional.
Page 2-8	Added CAUTION concerning uninsulated stacks and ambient temperatures.
Page 2-9	Added paragraph 2-2.c.3 concerning alarm contacts without autocalibration.
Page 2-10	Modified paragraph 2.3. Added paragraphs 2-3.a and b concerning autocalibration and alarms contacts.
Page 3-5	Added paragraph 3-3 concerning recommended configurations. Subsequent paragraphs renumbered.
Page 5-1	Modified paragraph 5-2 to explain alarm indications will be available via HART. Added paragraph 5-3 concerning alarm contacts and autocalibration. Subsequent paragraphs renumbered.
Page 5-2	Modified Table 5-1 Diagnostic/Unit Alarm Fault Definitions.
Page 6-8 through 6-10	Deleted references in paragraphs 6-5.b, c, and d to remove and install oxymitter from stack. Procedures 6-5.b, c, and d renumbered.
Page 6-14	Added paragraph 6-9 Ceramic Diffusion Element Replacement. Subsequent paragraphs renumbered.
Page 8-1	Changed Figure and Index No., Part Numbers, and Descriptions.
Page 8-2	Changed Figure and Index No.
Page 8-4	Changed Figure and Index No. and Description. Added Abrasive Shield Assemblies to parts list.
Page 8-5 through 8-7	Changed Figure and Index No. and Part Numbers.

HIGHLIGHTS OF CHANGES (Continued)

Effective Feb., 1999 Rev. 2.2

PAGE	SUMMARY
Pages 1-10 and 1-11	Modified the product matrix in Table 1-1. Removed the disposable gas bottles and flow regulators from the matrix and created Table 1-2 to distinguish these components as separate order items because the calibration gas bottles cannot be shipped via airfreight.
Page 1-12	Updated the numbering of subsequent tables in Section I.
Page 2-9	Added references to step 2 to direct users to the information explaining the contacts and additional alarm contacts associated with the IMPS 4000.
Page 2-10	Removed the IMPS 4000 information from paragraph 2-3.
Page 5-11	Removed step 2 explaining that a 204 mV to 1 volt DC value indicated high combustibles.
Pages 8-1 through 8-6	Updated part numbers.
Page 8-7	Updated part numbers and added Table 8-4 to list calibration gas bottles and flow regulators as replacement parts.

Effective Nov., 1999 Rev. 2.3

PAGE	SUMMARY
Pages xxiii thru xxix	Added new Quick Start Guide.
Page 1-8	Added information on electronics operating temperatures and parts for mounting.
Page 1-12	Removed Table 1-4, renumbered subsequent tables in Section I.
Page 3-3	Changed default values for SW2 to 3.8 mA and 22 mA in Figure 3-2.
Page 3-5	Updated default 4-20 mA signal values in paragraph 3-3.a.
Page 5-2	Updated Table 5-1 to include new Heater T/C fault 4, A/D Comm Error.
Page 5-6	Added new Figure 5-4 and paragraph d for Fault 4, A/D Comm Error.
Pages 5-7 thru 5-21	Updated subsequent figures and paragraphs in Section V.
Page 6-5	Updated Table 6-1 to include new Fault 4, A/D Comm Error.
Page 6-8	Added Note to paragraph 6-5.

ROSEMOUNT WARRANTY

Rosemount warrants that the equipment manufactured and sold by it will, upon shipment, be free of defects in workmanship or material. Should any failure to conform to this warranty become apparent during a period of one year after the date of shipment, Rosemount shall, upon prompt written notice from the purchaser, correct such nonconformity by repair or replacement, F.O.B. factory of the defective part or parts. Correction in the manner provided above shall constitute a fulfillment of all liabilities of Rosemount with respect to the quality of the equipment.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF QUALITY WHETHER WRITTEN, ORAL, OR IMPLIED (INCLUDING ANY WARRANTY OF MERCHANTABILITY OF FITNESS FOR PURPOSE).

The remedy(ies) provided above shall be purchaser's sole remedy(ies) for any failure of Rosemount to comply with the warranty provisions, whether claims by the purchaser are based in contract or in tort (including negligence).

Rosemount does not warrant equipment against normal deterioration due to environment. Factors such as corrosive gases and solid particulates can be detrimental and can create the need for repair or replacement as part of normal wear and tear during the warranty period.

Equipment supplied by Rosemount Analytical Inc. but not manufactured by it will be subject to the same warranty as is extended to Rosemount by the original manufacturer.

At the time of installation it is important that the required services are supplied to the system and that the electronic controller is set up at least to the point where it is controlling the sensor heater. This will ensure, that should there be a delay between installation and full commissioning that the sensor being supplied with ac power and reference air will not be subjected to component deterioration.

PURPOSE

The purpose of this manual is to provide a comprehensive understanding of the Oxymitter 4000 components, functions, installation, and maintenance.

This manual is designed to provide information about the Oxymitter 4000. We recommend that you thoroughly familiarize yourself with the Description and Installation sections before installing your transmitter.

The description presents the basic principles of the transmitter along with its performance characteristics and components. The remaining sections contain detailed procedures and information necessary to install and service the transmitter.

Before contacting Rosemount concerning any questions, first consult this manual. It describes most situations encountered in your equipment's operation and details necessary action.

DEFINITIONS

The following definitions apply to WARNINGS, CAUTIONS, and NOTES found throughout this publication.

WARNING

Highlights an operation or maintenance procedure, practice, condition, statement, etc. If not strictly observed, could result in injury, death, or long-term health hazards of personnel.

CAUTION

Highlights an operation or maintenance procedure, practice, condition, statement, etc. If not strictly observed, could result in damage to or destruction of equipment, or loss of effectiveness.

NOTE

Highlights an essential operating procedure, condition, or statement.

⊕ : EARTH (GROUND) TERMINAL

⊕ : PROTECTIVE CONDUCTOR TERMINAL

⚠ : RISK OF ELECTRICAL SHOCK

⚠ : WARNING: REFER TO INSTRUCTION BULLETIN

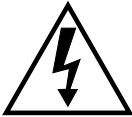
NOTE TO USERS

The number in the lower right corner of each illustration in this publication is a manual illustration number. It is not a part number, and is not related to the illustration in any technical manner.

IMPORTANT

SAFETY INSTRUCTIONS FOR THE WIRING AND INSTALLATION OF THIS APPARATUS

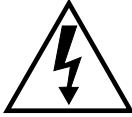
The following safety instructions apply specifically to all EU member states. They should be strictly adhered to in order to assure compliance with the Low Voltage Directive. Non-EU states should also comply with the following unless superseded by local or National Standards.

1. Adequate earth connections should be made to all earthing points, internal and external, where provided.
2. After installation or troubleshooting, all safety covers and safety grounds must be replaced. The integrity of all earth terminals must be maintained at all times.
3. Mains supply cords should comply with the requirements of IEC227 or IEC245.
4. All wiring shall be suitable for use in an ambient temperature of greater than 75°C.
5. All cable glands used should be of such internal dimensions as to provide adequate cable anchorage.
6. To ensure safe operation of this equipment, connection to the mains supply should only be made through a circuit breaker which will disconnect all circuits carrying conductors during a fault situation. The circuit breaker may also include a mechanically operated isolating switch. If not, then another means of disconnecting the equipment from the supply must be provided and clearly marked as such. Circuit breakers or switches must comply with a recognized standard such as IEC947. All wiring must conform with any local standards.
7. Where equipment or covers are marked with the symbol to the right, hazardous voltages are likely to be present beneath. These covers should only be removed when power is removed from the equipment — and then only by trained service personnel.
8. Where equipment or covers are marked with the symbol to the right, there is a danger from hot surfaces beneath. These covers should only be removed by trained service personnel when power is removed from the equipment. Certain surfaces may remain hot to the touch.
9. Where equipment or covers are marked with the symbol to the right, refer to the Operator Manual for instructions.
10. All graphical symbols used in this product are from one or more of the following standards: EN61010-1, IEC417, and ISO3864.

BELANGRIJK

Veiligheidsvoorschriften voor de aansluiting en installatie van dit toestel.

De hierna volgende veiligheidsvoorschriften zijn vooral bedoeld voor de EU lidstaten. Hier moet aan gehouden worden om de onderworpenheid aan de Laag Spannings Richtlijn (Low Voltage Directive) te verzekeren. Niet EU staten zouden deze richtlijnen moeten volgen tenzij zij reeds achterhaald zouden zijn door plaatselijke of nationale voorschriften.

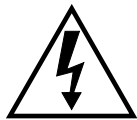
1. Degelijke aardingsaansluitingen moeten gemaakt worden naar alle voorziene aardpunten, intern en extern.
2. Na installatie of controle moeten alle veiligheidsdeksels en -aarding terug geplaatst worden. Ten alle tijde moet de betrouwbaarheid van de aarding behouden blijven.
3. Voedingskabels moeten onderworpen zijn aan de IEC227 of de IEC245 voorschriften.
4. Alle bekabeling moet geschikt zijn voor het gebruik in omgevingstemperaturen, hoger dan 75°C.
5. Alle wartels moeten zo gedimensioneerd zijn dat een degelijke kabel bevestiging verzekerd is.
6. Om de veilige werking van dit toestel te verzekeren, moet de voeding door een stroomonderbreker gevoerd worden (min 10A) welke alle draden van de voeding moet onderbreken. De stroomonderbreker mag een mechanische schakelaar bevatten. Zoniet moet een andere mogelijkheid bestaan om de voedingsspanning van het toestel te halen en ook duidelijk zo zijn aangegeven. Stroomonderbrekers of schakelaars moeten onderworpen zijn aan een erkende standaard zoals IEC947.
7. Waar toestellen of deksels aangegeven staan met het symbool is er meestal hoogspanning aanwezig. Deze deksels mogen enkel verwijderd worden nadat de voedingsspanning werd afgelegd en enkel door getraind onderhoudspersoneel.
8. Waar toestellen of deksels aangegeven staan met het symbool is er gevaar voor hete oppervlakken. Deze deksels mogen enkel verwijderd worden door getraind onderhoudspersoneel nadat de voedingsspanning verwijderd werd. Sommige oppervlakken kunnen 45 minuten later nog steeds heet aanvoelen.
9. Waar toestellen of deksels aangegeven staan met het symbool gelieve het handboek te raadplegen.
10. Alle grafische symbolen gebruikt in dit produkt, zijn afkomstig uit een of meer van devolgende standaards: EN61010-1, IEC417 en ISO3864.

VIGTIGT

Sikkerhedsinstruktion for tilslutning og installation af dette udstyr.

Følgende sikkerhedsinstruktioner gælder specifikt i alle EU-medlemslande.

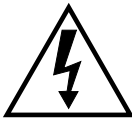
Instruktionerne skal nøje følges for overholdelse af Lavspændingsdirektivet og bør også følges i ikke EU-lande medmindre andet er specificeret af lokale eller nationale standarder.

1. Passende jordforbindelser skal tilsluttes alle jordklemmer, interne og eksterne, hvor disse forefindes.
2. Efter installation eller fejlfinding skal alle sikkerhedsdæksler og jordforbindelser reetableres.
3. Forsyningskabler skal opfylde krav specificeret i IEC227 eller IEC245.
4. Alle ledningstilslutninger skal være konstrueret til omgivelsestemperatur højere end 75° C.
5. Alle benyttede kabelforskrutninger skal have en intern dimension, så passende kabelaflastning kan etableres.
6. For opnåelse af sikker drift og betjening skal der skabes beskyttelse mod indirekte berøring gennem afbryder (min. 10A), som vil afbryde alle kredsløb med elektriske ledere i fejlsituation. Afbryderen skal indholde en mekanisk betjent kontakt. Hvis ikke skal anden form for afbryder mellem forsyning og udstyr benyttes og mærkes som sådan. Afbrydere eller kontakter skal overholde en kendt standard som IEC947.
7. Hvor udstyr eller dæksler er mærket med dette symbol, er farlige spændinger normalt forekom-mende bagved. Disse dæksler bør kun afmonteres, når forsyningsspændingen er frakoblet - og da kun af instrueret servicepersonale. 
8. Hvor udstyr eller dæksler er mærket med dette symbol, forefindes meget varme overflader bagved. Disse dæksler bør kun afmonteres af instrueret servicepersonale, når forsyningsspænding er frakoblet. Visse overflader vil stadig være for varme at berøre i op til 45 minutter efter frakobling. 
9. Hvor udstyr eller dæksler er mærket med dette symbol, se da i betjeningsmanual for instruktion. 
10. Alle benyttede grafiske symboler i dette udstyr findes i én eller flere af følgende standarder:- EN61010-1, IEC417 & ISO3864.

BELANGRIJK

Veiligheidsinstructies voor de bedrading en installatie van dit apparaat.

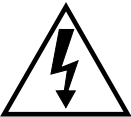
Voor alle EU lidstaten zijn de volgende veiligheidsinstructies van toepassing. Om aan de geldende richtlijnen voor laagspanning te voldoen dient men zich hieraan strikt te houden. Ook niet EU lidstaten dienen zich aan het volgende te houden, tenzij de lokale wetgeving anders voorschrijft.

1. Alle voorziene interne- en externe aardaansluitingen dienen op adequate wijze aangesloten te worden.
2. Na installatie, onderhouds- of reparatie werkzaamheden dienen alle beschermdeksels /kappen en aardingen om reden van veiligheid weer aangebracht te worden.
3. Voedingskabels dienen te voldoen aan de vereisten van de normen IEC 227 of IEC 245.
4. Alle bedrading dient geschikt te zijn voor gebruik bij een omgevings temperatuur boven 75°C.
5. Alle gebruikte kabelwartels dienen dusdanige inwendige afmetingen te hebben dat een adequate verankering van de kabel wordt verkregen.
6. Om een veilige werking van de apparatuur te waarborgen dient de voeding uitsluitend plaats te vinden via een meerpole automatische zekering (min. 10A) die **alle** spanningvoerende geleiders verbreekt indien een foutconditie optreedt. Deze automatische zekering mag ook voorzien zijn van een mechanisch bediende schakelaar. Bij het ontbreken van deze voorziening dient een andere als zodanig duidelijk aangegeven mogelijkheid aanwezig te zijn om de spanning van de apparatuur af te schakelen. Zekeringen en schakelaars dienen te voldoen aan een erkende standaard zoals IEC 947.
7. Waar de apparatuur of de beschermdeksels/kappen gemarkeerd zijn met het volgende symbool, kunnen zich hieronder spanning voerende delen bevinden die gevaar op kunnen leveren. Deze beschermdeksels/kappen mogen uitsluitend verwijderd worden door getraind personeel als de spanning is afgeschakeld.
8. Waar de apparatuur of de beschermdeksels/kappen gemarkeerd zijn met het volgende symbool, kunnen zich hieronder hete oppervlakken of onderdelen bevinden. Bepaalde delen kunnen mogelijk na 45 min. nog te heet zijn om aan te raken.
9. Waar de apparatuur of de beschermdeksels/kappen gemarkeerd zijn met het volgende symbool, dient men de bedieningshandleiding te raadplegen.
10. Alle grafische symbolen gebruikt bij dit produkt zijn volgens een of meer van de volgende standaarden: EN 61010-1, IEC 417 & ISO 3864.

TÄRKEÄÄ

Turvallisuusohje, jota on noudatettava tämän laitteen asentamisessa ja kaapeloinnissa.

Seuraavat ohjeet pätevät erityisesti EU:n jäsenvaltioissa. Niitä täytyy ehdottomasti noudattaa jotta täytettäisiin EU:n matalajännitedirektiivin (Low Voltage Directive) yhteensopivuus. Myös EU:hun kuulumattomien valtioiden tulee noudattaa tätä ohjetta, elleivät kansalliset standardit estä sitä.

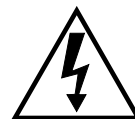
1. Riittävät maadoituskytkennät on tehtävä kaikkiin maadoituspisteisiin, sisäisiin ja ulkoisiin.
2. Asennuksen ja vianetsinnän jälkeen on kaikki suojat ja suojamaat asennettava takaisin paikoilleen. Maadoitusliittimen kunnollinen toiminta täytyy aina ylläpitää.
3. Jännitesyöttöjohtimien täytyy täyttää IEC227 ja IEC245 vaatimukset.
4. Kaikkien johdotuksien tulee toimia $>75^{\circ}\text{C}$ lämpötiloissa.
5. Kaikkien läpivientiholkkien sisähalkaisijan täytyy olla sellainen että kaapeli lukkiutuu kunnolla kiinni.
6. Turvallisen toiminnan varmistamiseksi täytyy jännitesyöttö varustaa turvakytkimellä (min 10A), joka kytkee irti kaikki jännitesyöttöjohtimet vikatilanteessa. Suojaan täytyy myös sisältyä mekaaninen erotuskytkin. Jos ei, niin jännitesyöttö on pystyttävä katkaisemaan muilla keinoilla ja merkittävä siten että se tunnistetaan sellaiseksi. Turvakytkimien tai katkaisimien täytyy täyttää IEC947 standardin vaatimukset näkyvyydestä.
7. Mikäli laite tai kosketussuoja on merkitty tällä merkillä on merkinnän takana tai alla hengenvaarallisen suuruinen jännite. Suojaa ei saa poistaa jänniteen ollessa kytkettynä laitteeseen ja poistamisen saa suorittaa vain alan asiantuntija.
8. Mikäli laite tai kosketussuoja on merkitty tällä merkillä on merkinnän takana tai alla kuuma pinta. Suojaa saa poistaa vain alan asiantuntija kun jännite-syöttö on katkaistu. Tällainen pinta voi säilyä kosketuskuumana jopa 45 minuuttia.
9. Mikäli laite tai kosketussuoja on merkitty tällä merkillä katso lisäohjeita käyttöohjekirjasta
10. Kaikki tässä tuotteessa käytetyt graafiset symbolit ovat yhdestä tai useammasta seuraavista standardeista: EN61010-1, IEC417 & ISO3864.

IMPORTANT

Consignes de sécurité concernant le raccordement et l'installation de cet appareil.

Les consignes de sécurité ci-dessous s'adressent particulièrement à tous les états membres de la communauté européenne. Elles doivent être strictement appliquées afin de satisfaire aux directives concernant la basse tension. Les états non membres de la communauté européenne doivent également appliquer ces consignes sauf si elles sont en contradiction avec les standards locaux ou nationaux.

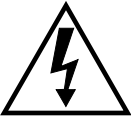
1. Un raccordement adéquat à la terre doit être effectuée à chaque borne de mise à la terre, interne et externe.
2. Après installation ou dépannage, tous les capots de protection et toutes les prises de terre doivent être remis en place, toutes les prises de terre doivent être respectées en permanence.
3. Les câbles d'alimentation électrique doivent être conformes aux normes IEC227 ou IEC245
4. Tous les raccordements doivent pouvoir supporter une température ambiante supérieure à 75°C.
5. Tous les presse-étoupes utilisés doivent avoir un diamètre interne en rapport avec les câbles afin d'assurer un serrage correct sur ces derniers.
6. Afin de garantir la sécurité du fonctionnement de cet appareil, le raccordement à l'alimentation électrique doit être réalisé exclusivement au travers d'un disjoncteur (minimum 10A.) isolant tous les conducteurs en cas d'anomalie. Ce disjoncteur doit également pouvoir être actionné manuellement, de façon mécanique. Dans le cas contraire, un autre système doit être mis en place afin de pouvoir isoler l'appareil et doit être signalisé comme tel. Disjoncteurs et interrupteurs doivent être conformes à une norme reconnue telle IEC947.
7. Lorsque les équipements ou les capots affichent le symbole suivant, cela signifie que des tensions dangereuses sont présentes. Ces capots ne doivent être démontés que lorsque l'alimentation est coupée, et uniquement par un personnel compétent.
8. Lorsque les équipements ou les capots affichent le symbole suivant, cela signifie que des surfaces dangereusement chaudes sont présentes. Ces capots ne doivent être démontés que lorsque l'alimentation est coupée, et uniquement par un personnel compétent. Certaines surfaces peuvent rester chaudes jusqu'à 45 mn.
9. Lorsque les équipements ou les capots affichent le symbole suivant, se reporter au manuel d'instructions.
10. Tous les symboles graphiques utilisés dans ce produit sont conformes à un ou plusieurs des standards suivants: EN61010-1, IEC417 & ISO3864.



Wichtig

Sicherheitshinweise für den Anschluß und die Installation dieser Geräte.

Die folgenden Sicherheitshinweise sind in allen Mitgliederstaaten der europäischen Gemeinschaft gültig. Sie müssen strikt eingehalten werden, um der Niederspannungsrichtlinie zu genügen. Nichtmitgliedsstaaten der europäischen Gemeinschaft sollten die national gültigen Normen und Richtlinien einhalten.

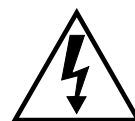
1. Alle intern und extern vorgesehenen Erdungen der Geräte müssen ausgeführt werden.
2. Nach Installation, Reparatur oder sonstigen Eingriffen in das Gerät müssen alle Sicherheitsabdeckungen und Erdungen wieder installiert werden. Die Funktion aller Erdverbindungen darf zu keinem Zeitpunkt gestört sein.
3. Die Netzspannungsversorgung muß den Anforderungen der IEC227 oder IEC245 genügen.
4. Alle Verdrahtungen sollten mindestens bis 75 °C ihre Funktion dauerhaft erfüllen.
5. Alle Kabeldurchführungen und Kabelverschraubungen sollten in Ihrer Dimensionierung so gewählt werden, daß diese eine sichere Verkabelung des Gerätes ermöglichen.
6. Um eine sichere Funktion des Gerätes zu gewährleisten, muß die Spannungsversorgung über mindestens 10 A abgesichert sein. Im Fehlerfall muß dadurch gewährleistet sein, daß die Spannungsversorgung zum Gerät bzw. zu den Geräten unterbrochen wird. Ein mechanischer Schutzschalter kann in dieses System integriert werden. Falls eine derartige Vorrichtung nicht vorhanden ist, muß eine andere Möglichkeit zur Unterbrechung der Spannungszufuhr gewährleistet werden mit Hinweisen deutlich gekennzeichnet werden. Ein solcher Mechanismus zur Spannungsunterbrechung muß mit den Normen und Richtlinien für die allgemeine Installation von Elektrogeräten, wie zum Beispiel der IEC947, übereinstimmen.
7. Mit dem Symbol sind Geräte oder Abdeckungen gekennzeichnet, die eine gefährliche (Netzspannung) Spannung führen. Die Abdeckungen dürfen nur entfernt werden, wenn die Versorgungsspannung unterbrochen wurde. Nur geschultes Personal darf an diesen Geräten Arbeiten ausführen. 
8. Mit dem Symbol sind Geräte oder Abdeckungen gekennzeichnet, in bzw. unter denen heiße Teile vorhanden sind. Die Abdeckungen dürfen nur entfernt werden, wenn die Versorgungsspannung unterbrochen wurde. Nur geschultes Personal darf an diesen Geräten Arbeiten ausführen. Bis 45 Minuten nach dem Unterbrechen der Netzzufuhr können derartig Teile noch über eine erhöhte Temperatur verfügen. 
9. Mit dem Symbol sind Geräte oder Abdeckungen gekennzeichnet, bei denen vor dem Eingriff die entsprechenden Kapitel im Handbuch sorgfältig durchgelesen werden müssen. 
10. Alle in diesem Gerät verwendeten graphischen Symbole entspringen einem oder mehreren der nachfolgend aufgeführten Standards: EN61010-1, IEC417 & ISO3864.

IMPORTANTE

Norme di sicurezza per il cablaggio e l'installazione dello strumento.

Le seguenti norme di sicurezza si applicano specificatamente agli stati membri dell'Unione Europea, la cui stretta osservanza è richiesta per garantire conformità alla Direttiva del Basso Voltaggio. Esse si applicano anche agli stati non appartenenti all'Unione Europea, salvo quanto disposto dalle vigenti normative locali o nazionali.

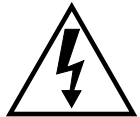
1. Collegamenti di terra idonei devono essere eseguiti per tutti i punti di messa a terra interni ed esterni, dove previsti.
2. Dopo l'installazione o la localizzazione dei guasti, assicurarsi che tutti i coperchi di protezione siano stati collocati e le messa a terra siano collegate. L'integrità di ciascun morsetto di terra deve essere costantemente garantita.
3. I cavi di alimentazione della rete devono essere secondo disposizioni IEC227 o IEC245.
4. L'intero impianto elettrico deve essere adatto per uso in ambiente con temperature superiore a 75°C.
5. Le dimensioni di tutti i connettori dei cavi utilizzati devono essere tali da consentire un adeguato ancoraggio al cavo.
6. Per garantire un sicuro funzionamento dello strumento il collegamento alla rete di alimentazione principale dovrà essere eseguita tramite interruttore automatico (min.10A), in grado di disattivare tutti i conduttori di circuito in caso di guasto. Tale interruttore dovrà inoltre prevedere un sezionatore manuale o altro dispositivo di interruzione dell'alimentazione, chiaramente identificabile. Gli interruttori dovranno essere conformi agli standard riconosciuti, quali IEC947.
7. Il simbolo riportato sullo strumento o sui coperchi di protezione indica probabile presenza di elevati voltaggi. Tali coperchi di protezione devono essere rimossi esclusivamente da personale qualificato, dopo aver tolto alimentazione allo strumento.
8. Il simbolo riportato sullo strumento o sui coperchi di protezione indica rischio di contatto con superfici ad alta temperatura. Tali coperchi di protezione devono essere rimossi esclusivamente da personale qualificato, dopo aver tolto alimentazione allo strumento. Alcune superfici possono mantenere temperature elevate per oltre 45 minuti.
9. Se lo strumento o il coperchio di protezione riportano il simbolo, fare riferimento alle istruzioni del manuale Operatore.
10. Tutti i simboli grafici utilizzati in questo prodotto sono previsti da uno o più dei seguenti standard: EN61010-1, IEC417 e ISO3864.



VIKTIG

Sikkerhetsinstruks for tilkobling og installasjon av dette utstyret.

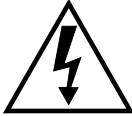
Følgende sikkerhetsinstruksjoner gjelder spesifikt alle EU medlemsland og land med i EØS-avtalen. Instruksjonene skal følges nøye slik at installasjonen blir i henhold til lavspenningsdirektivet. Den bør også følges i andre land, med mindre annet er spesifisert av lokale- eller nasjonale standarder.

1. Passende jordforbindelser må tilkobles alle jordingspunkter, interne og eksterne hvor disse forefinnes.
2. Etter installasjon eller feilsøking skal alle sikkerhetsdeksler og jordforbindelser reetableres. Jordingsforbindelsene må alltid holdes i god stand.
3. Kabler fra spenningsforsyning skal oppfylle kravene spesifisert i IEC227 eller IEC245.
4. Alle ledningsforbindelser skal være konstruert for en omgivelsestemperatur høyere en 750C.
5. Alle kabelforskruvninger som benyttes skal ha en indre dimensjon slik at tilstrekkelig avlastning oppnåes.
6. For å oppnå sikker drift og betjening skal forbindelsen til spenningsforsyningen bare skje gjennom en strømbryter (minimum 10A) som vil bryte spenningsforsyningen til alle elektriske kretser ved en feilsituasjon. Strømbryteren kan også inneholde en mekanisk operert bryter for å isolere instrumentet fra spenningsforsyningen. Dersom det ikke er en mekanisk operert bryter installert, må det være en annen måte å isolere utstyret fra spenningsforsyningen, og denne måten må være tydelig merket. Kretsbytere eller kontakter skal oppfylle kravene i en anerkjent standard av typen IEC947 eller tilsvarende.
7. Der hvor utstyr eller deksler er merket med symbol for farlig spenning, er det sannsynlig at disse er tilstede bak dekslet. Disse dekslene må bare fjernes når spenningsforsyning er frakoblet utstyret, og da bare av trenet servicepersonell. 
8. Der hvor utstyr eller deksler er merket med symbol for meget varm overflate, er det sannsynlig at disse er tilstede bak dekslet. Disse dekslene må bare fjernes når spenningsforsyning er frakoblet utstyret, og da bare av trenet servicepersonell. Noen overflater kan være for varme til å berøres i opp til 45 minutter etter spenningsforsyning frakoblet. 
9. Der hvor utstyret eller deksler er merket med symbol, vennligst referer til instruksjonsmanualen for instruks. 
10. Alle grafiske symboler brukt i dette produktet er fra en eller flere av følgende standarder: EN61010-1, IEC417 & ISO3864.

IMPORTANTE

Instruções de segurança para ligação e instalação deste aparelho.

As seguintes instruções de segurança aplicam-se especificamente a todos os estados membros da UE. Devem ser observadas rigidamente por forma a garantir o cumprimento da Directiva sobre Baixa Tensão. Relativamente aos estados que não pertençam à UE, deverão cumprir igualmente a referida directiva, exceptuando os casos em que a legislação local a tiver substituído.

1. Devem ser feitas ligações de terra apropriadas a todos os pontos de terra, internos ou externos.
2. Após a instalação ou eventual reparação, devem ser recolocadas todas as tampas de segurança e terras de protecção. Deve manter-se sempre a integridade de todos os terminais de terra.
3. Os cabos de alimentação eléctrica devem obedecer às exigências das normas IEC227 ou IEC245.
4. Os cabos e fios utilizados nas ligações eléctricas devem ser adequados para utilização a uma temperatura ambiente até 75° C.
5. As dimensões internas dos buçins dos cabos devem ser adequadas a uma boa fixação dos cabos.
6. Para assegurar um funcionamento seguro deste equipamento, a ligação ao cabo de alimentação eléctrica deve ser feita através de um disjuntor (min. 10A) que desligará todos os condutores de circuitos durante uma avaria. O disjuntor poderá também conter um interruptor de isolamento accionado manualmente. Caso contrário, deverá ser instalado qualquer outro meio para desligar o equipamento da energia eléctrica, devendo ser assinalado convenientemente. Os disjuntores ou interruptores devem obedecer a uma norma reconhecida, tipo IEC947.
7. Sempre que o equipamento ou as tampas contiverem o símbolo, é provável a existência de tensões perigosas. Estas tampas só devem ser retiradas quando a energia eléctrica tiver sido desligada e por Pessoal da Assistência devidamente treinado. 
8. Sempre que o equipamento ou as tampas contiverem o símbolo, há perigo de existência de superfícies quentes. Estas tampas só devem ser retiradas por Pessoal da Assistência devidamente treinado e depois de a energia eléctrica ter sido desligada. Algumas superfícies permanecem quentes até 45 minutos depois. 
9. Sempre que o equipamento ou as tampas contiverem o símbolo, o Manual de Funcionamento deve ser consultado para obtenção das necessárias instruções. 
10. Todos os símbolos gráficos utilizados neste produto baseiam-se em uma ou mais das seguintes normas: EN61010-1, IEC417 e ISO3864.

IMPORTANTE

Instrucciones de seguridad para el montaje y cableado de este aparato.

Las siguientes instrucciones de seguridad , son de aplicacion especifica a todos los miembros de la UE y se adjuntaran para cumplir la normativa europea de baja tension.

1. Se deben preveer conexiones a tierra del equipo, tanto externa como internamente, en aquellos terminales previstos al efecto.
2. Una vez finalizada las operaciones de mantenimiento del equipo, se deben volver a colocar las cubiertas de seguridad aasi como los terminales de tierra. Se debe comprobar la integridad de cada terminal.
3. Los cables de alimentacion electrica cumplan con las normas IEC 227 o IEC 245.
4. Todo el cableado sera adecuado para una temperatura ambiental de 75°C.
5. Todos los prensaestopas seran adecuados para una fijacion adecuada de los cables.
6. Para un manejo seguro del equipo, la alimentacion electrica se realizara a traves de un interruptor magnetotermico (min 10 A), el cual desconectara la alimentacion electrica al equipo en todas sus fases durante un fallo. Los interruptores estaran de acuerdo a la norma IEC 947 u otra de reconocido prestigio.
7. Cuando las tapas o el equipo lleve impreso el simbolo de tension electrica peligrosa, dicho alojamiento solamente se abra una vez que se haya interrumpido la alimentacion electrica al equipo asimismo la intervencion sera llevada a cabo por personal entrenado para estas labores.
8. Cuando las tapas o el equipo lleve impreso el simbolo, hay superficies con alta temperatura, por tanto se abra una vez que se haya interrumpido la alimentacion electrica al equipo por personal entrenado para estas labores, y al menos se esperara unos 45 minutos para enfriar las superficies calientes.
9. Cuando el equipo o la tapa lleve impreso el simbolo, se consultara el manual de instrucciones.
10. Todos los simbolos graficos usados en esta hoja, estan de acuerdo a las siguientes normas EN61010-1, IEC417 & ISO 3864.



VIKTIGT

Säkerhetsföreskrifter för kablage och installation av denna apparat.

Följande säkerhetsföreskrifter är tillämpliga för samtliga EU-medlemsländer. De skall följas i varje avseende för att överensstämma med Lågspännings direktivet. Icke EU medlemsländer skall också följa nedanstående punkter, såvida de inte övergrips av lokala eller nationella föreskrifter.

1. Tillämplig jordkontakt skall utföras till alla jordade punkter, såväl internt som externt där så erfordras.
2. Efter installation eller felsökning skall samtliga säkerhetshöljen och säkerhetsjord återplaceras. Samtliga jordterminaler måste hållas obrutna hela tiden.
3. Matningsspänningens kabel måste överensstämma med föreskrifterna i IEC227 eller IEC245.
4. Allt kablage skall vara lämpligt för användning i en omgivningstemperatur högre än 75°C.
5. Alla kabelförskruvningar som används skall ha inre dimensioner som motsvarar adekvat kabelförankring.
6. För att säkerställa säker drift av denna utrustning skall anslutning till huvudströmmen endast göras genom en säkring (min 10A) som skall fränkoppla alla strömförande kretsar när något fel uppstår. Säkringen kan även ha en mekanisk fränkiljare. Om så inte är fallet, måste ett annat förfarande för att fränkilja utrustningen från strömförsörjning tillhandahållas och klart framgå genom markering. Säkring eller omkopplare måste överensstämma med en gällande standard såsom t ex IEC947.
7. Där utrustning eller hölje är markerad med vidstående symbol föreligger risk för livsfarlig spänning i närheten. Dessa höljen får endast avlägsnas när strömmen ej är ansluten till utrustningen - och då endast av utbildad servicepersonal. 
8. När utrustning eller hölje är markerad med vidstående symbol föreligger risk för brännskada vid kontakt med uppvärmd yta. Dessa höljen får endast avlägsnas av utbildad servicepersonal, när strömmen kopplats från utrustningen. Vissa ytor kan vara mycket varma att vidröra även upp till 45 minuter efter avstängning av strömmen. 
9. När utrustning eller hölje markerats med vidstående symbol bör instruktionsmanualen studeras för information. 
10. Samtliga grafiska symboler som förekommer i denna produkt finns angivna i en eller flera av följande föreskrifter:- EN61010-1, IEC417 & ISO3864.

ΠΡΟΣΟΧΗ

Οδηγίες ασφαλείας για την καλωδίωση και εγκατάσταση της συσκευής.

Οι ακόλουθες οδηγίες ασφαλείας εφαρμόζονται ειδικά σε όλες τις χώρες μέλη της Ευρωπαϊκής Κοινότητας. Θα πρέπει να ακολουθούνται αυστηρά ώστε να εξασφαλιστεί η συμβατότητα με τις οδηγίες για τη Χαμηλή Τάση. Χώρες που δεν είναι μέλη της Ευρωπαϊκής Κοινότητας θα πρέπει επίσης να ακολουθούν τις οδηγίες εκτός εάν αντικαθίστανται από τα Τοπικά ή Εθνικά Πρότυπα.

1. Επαρκείς συνδέσεις γείωσης θα πρέπει να γίνονται σε όλα τα σημεία γείωσης, εσωτερικά και εξωτερικά όπου υπάρχουν.
2. Μετά την εγκατάσταση ή την εκσφαλμάτωση όλα τα καλύματα ασφαλείας και οι γειώσεις ασφαλείας πρέπει να επανεγκαθίστανται. Η καλή κατάσταση όλων των ακροδεκτών γείωσης πρέπει να ελέγχεται και να συντηρείται διαρκώς.
3. Τα καλώδια τροφοδοσίας πρέπει να πληρούν τις απαιτήσεις των IEC227 ή IEC245.
4. Όλες οι καλωδιώσεις θα πρέπει είναι κατάλληλες για χρήση σε ατμοσφαιρική θερμοκρασία χώρου υψηλότερη από 75°C.
5. Όλοι οι στυπιοθλίπτες θα πρέπει να είναι τέτοιων εσωτερικών διαστάσεων ώστε να παρέχουν επαρκή στερέωση των καλωδίων.
6. Για τη διασφάλιση ασφαλούς λειτουργίας της σύνδεσης τροφοδοσίας αυτής της συσκευής θα πρέπει να γίνεται μόνο μέσω ασφαλειοδιακόπτη (ελάχιστο 10A) ο οποίος θα αποσυνδέει όλους του ηλεκτροφόρους αγωγούς στη διάρκεια κατάστασης σφάλματος.
Ο ασφαλειοδιακόπτης μπορεί επίσης να περιλαμβάνει μηχανικό διακόπτη απομόνωσης. Εάν δεν περιλαμβάνει, τότε άλλα μέσα αποσύνδεσης της συσκευής από την τροφοδοσία πρέπει να παροχρηθούν και σαφώς να σημειθούν σαν τέτοια. Οι ασφαλειοδιακόπτες ή διακόπτες πρέπει να συμφωνούν με αναγνωρισμένα πρότυπα όπως το IEC947.
7. Όπου συσκευές ή καλύματα είναι σημασμένα με το σύμβολο επικίνδυνες τάσεις ενυπάρχουν κάτω από αυτά.
Αυτά τα καλύματα θα πρέπει να αφαιρούνται μόνο όταν έχει αφαιρεθεί η τροφοδοσία από τη συσκευή και τότε μόνο από ειδικευμένο τεχνικό προσωπικό.
8. Όπου συσκευές ή καλύματα είναι σημασμένα με το σύμβολο υπάρχει κίνδυνος από καυτές επιφάνειες κάτω από αυτά.
Αυτά τα καλύματα θα πρέπει να αφαιρούνται μόνο από ειδικευμένο τεχνικό προσωπικό, όταν η τροφοδοσία έχει αφαιρεθεί από τη συσκευή. Τέτοιες επιφάνειες μπορούν να παραμείνουν ζεστές στην αφή έως και 45 λεπτά αργότερα.
9. Όπου συσκευές ή καλύματα είναι σημασμένα με το σύμβολο αναφερθείται στις οδηγίες χρήσης της συσκευής.
10. Όλα τα γραφικά σύμβολα που χρησιμοποιούνται σε αυτό το προϊόν είναι από ένα ή περισσότερα από τα έχης πρότυπα: EN61010-1, IEC417 και ISO3864.



CERAMIC FIBER PRODUCTS MATERIAL SAFETY DATA SHEET JULY 1, 1996
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SECTION I. IDENTIFICATION

PRODUCT NAME

Ceramic Fiber Heaters, Molded Insulation Modules and Ceramic Fiber Radiant Heater Panels.

CHEMICAL FAMILY

Vitreous Aluminosilicate Fibers with Silicon Dioxide.

CHEMICAL NAME

N.A.

CHEMICAL FORMULA

N.A.

MANUFACTURER'S NAME AND ADDRESS

Watlow Columbia
2101 Pennsylvania Drive
Columbia, MO 65202

573-474-9402
573-814-1300, ext. 5170

HEALTH HAZARD SUMMARY WARNING
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- Possible cancer hazard based on tests with laboratory animals.
- May be irritating to skin, eyes and respiratory tract.
- May be harmful if inhaled.
- Cristobalite (crystalline silica) formed at high temperatures (above 1800°F) can cause severe respiratory disease.

SECTION II. PHYSICAL DATA

APPEARANCE AND ODOR

Cream to white colored fiber shapes. With or without optional white to gray granular surface coating and/or optional black surface coating.

SPECIFIC WEIGHT: 12-25 lb./cubic foot

BOILING POINT: N.A.

VOLATILES (% BY WT.): N.A.

WATER SOLUBILITY: N.A.

SECTION III. HAZARDOUS INGREDIENTS

MATERIAL, QUANTITY, AND THRESHOLD/EXPOSURE LIMIT VALUES

Aluminosilicate (vitreous) 99+ %	1 fiber/cc TWA
CAS. No. 142844-00-06	10 fibers/cc CL
Zirconium Silicate	0-10% 5 mg/cubic meter (TLV)
Black Surface Coating**	0 - 1% 5 mg/cubic meter (TLV)
Amorphous Silica/Silicon Dioxide	0-10% 20 mppcf (6 mg/cubic meter)
	PEL (OSHA 1978) 3 gm cubic meter
	(Respirable dust): 10 mg/cubic meter,
	Intended TLV (ACGIH 1984-85)

**Composition is a trade secret.

SECTION IV. FIRE AND EXPLOSION DATA

FLASH POINT: None

FLAMMABILITY LIMITS: N.A.

EXTINGUISHING MEDIA

Use extinguishing agent suitable for type of surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS / SPECIAL FIRE FIGHTING PROCEDURES

N.A.

SECTION V. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

(See Section III)

EFFECTS OF OVER EXPOSURE

EYE

Avoid contact with eyes. Slightly to moderately irritating. Abrasive action may cause damage to outer surface of eye.

INHALATION

May cause respiratory tract irritation. Repeated or prolonged breathing of particles of respirable size may cause inflammation of the lung leading to chest pain, difficult breathing, coughing and possible fibrotic change in the lung (Pneumoconiosis). Pre-existing medical conditions may be aggravated by exposure: specifically, bronchial hyper-reactivity and chronic bronchial or lung disease.

INGESTION

May cause gastrointestinal disturbances. Symptoms may include irritation and nausea, vomiting and diarrhea.

SKIN

Slightly to moderate irritating. May cause irritation and inflammation due to mechanical reaction to sharp, broken ends of fibers.

EXPOSURE TO USED CERAMIC FIBER PRODUCT

Product which has been in service at elevated temperatures (greater than 1800°F/982°C) may undergo partial conversion to cristobalite, a form of crystalline silica which can cause severe respiratory disease (Pneumoconiosis). The amount of cristobalite present will depend on the temperature and length of time in service. (See Section IX for permissible exposure levels).

SPECIAL TOXIC EFFECTS

The existing toxicology and epidemiology data bases for RCF's are still preliminary. Information will be updated as studies are completed and reviewed. The following is a review of the results to date:

EPIDEMIOLOGY

At this time there are no known published reports demonstrating negative health outcomes of workers exposed to refractory ceramic fiber (RCF). Epidemiologic investigations of RCF production workers are ongoing.

- 1) There is no evidence of any fibrotic lung disease (interstitial fibrosis) whatsoever on x-ray.
- 2) There is no evidence of any lung disease among those employees exposed to RCF that had never smoked.
- 3) A statistical "trend" was observed in the exposed population between the duration of exposure to RCF and a decrease in some measures of pulmonary function. These observations are clinically insignificant. In other words, if these observations were made on an individual employee, the results would be interpreted as being within the normal range.

- 4) Pleural plaques (thickening along the chest wall) have been observed in a small number of employees who had a long duration of employment. There are several occupational and non-occupational causes for pleural plaque. It should be noted that plaques are not “pre-cancer” nor are they associated with any measurable effect on lung function.

TOXICOLOGY

A number of studies on the health effects of inhalation exposure of rats and hamsters are available. Rats were exposed to RCF in a series of life-time nose-only inhalation studies. The animals were exposed to 30, 16, 9, and 3 mg/m³, which corresponds with approximately 200, 150, 75, and 25 fibers/cc.

Animals exposed to 30 and 16 mg/m³ were observed to have developed a pleural and parenchymal fibroses; animals exposed to 9 mg/m³ had developed a mild parenchymal fibrosis; animals exposed to the lowest dose were found to have the response typically observed any time a material is inhaled into the deep lung. While a statistically significant increase in lung tumors was observed following exposure to the highest dose, there was no excess lung cancers at the other doses. Two rats exposed to 30 mg/m³ and one rat exposed to 9 mg/m³ developed mesotheliomas.

The International Agency for Research on Cancer (IARC) reviewed the carcinogenicity data on man-made vitreous fibers (including ceramic fiber, glasswool, rockwool, and slagwool) in 1987. IARC classified ceramic fiber, fibrous glasswool and mineral wool (rockwool and slagwool) as possible human carcinogens (Group 2B).

EMERGENCY FIRST AID PROCEDURES

EYE CONTACT

Flush eyes immediately with large amounts of water for approximately 15 minutes. Eye lids should be held away from the eyeball to insure thorough rinsing. Do not rub eyes. Get medical attention if irritation persists.

INHALATION

Remove person from source of exposure and move to fresh air. Some people may be sensitive to fiber induced irritation of the respiratory tract. If symptoms such as shortness of breath, coughing, wheezing or chest pain develop, seek medical attention. If person experiences continued breathing difficulties, administer oxygen until medical assistance can be rendered.

INGESTION

Do not induce vomiting. Get medical attention if irritation persists.

SKIN CONTACT

Do not rub or scratch exposed skin. Wash area of contact thoroughly with soap and water. Using a skin cream or lotion after washing may be helpful. Get medical attention if irritation persists.

SECTION VI. REACTIVITY DATA

STABILITY/CONDITIONS TO AVOID

Stable under normal conditions of use.

HAZARDOUS POLYMERIZATION/CONDITIONS TO AVOID

N.A.

INCOMPATIBILITY/MATERIALS TO AVOID

Incompatible with hydrofluoric acid and concentrated alkali.

HAZARDOUS DECOMPOSITION PRODUCTS

N.A.

SECTION VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Where possible, use vacuum suction with HEPA filters to clean up spilled material. Use dust suppressant where sweeping if necessary. Avoid clean up procedure which may result in water pollution. (Observe Special Protection Information Section VIII.)

WASTE DISPOSAL METHODS

The transportation, treatment, and disposal of this waste material must be conducted in compliance with all applicable Federal, State, and Local regulations.

SECTION VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION

Use NIOSH or MSHA approved equipment when airborne exposure limits may be exceeded. NIOSH/MSHA approved breathing equipment may be required for non-routine and emergency use. (See Section IX for suitable equipment).

Pending the results of long term health effects studies, engineering control of airborne fibers to the lowest levels attainable is advised.

VENTILATION

Ventilation should be used whenever possible to control or reduce airborne concentrations of fiber and dust. Carbon monoxide, carbon dioxide, oxides of nitrogen, reactive hydrocarbons and a small amount of formaldehyde may accompany binder burn-off during first heat. Use adequate ventilation or other precautions to eliminate vapors resulting from binder burn-off. Exposure to burn-off fumes may cause respiratory tract irritation, bronchial hyper-reactivity and asthmatic response.

SKIN PROTECTION

Wear gloves, hats and full body clothing to prevent skin contact. Use separate lockers for work clothes to prevent fiber transfer to street clothes. Wash work clothes separately from other clothing and rinse washing machine thoroughly after use.

EYE PROTECTION

Wear safety glasses or chemical worker's goggles to prevent eye contact. Do not wear contact lenses when working with this substance. Have eye baths readily available where eye contact can occur.

SECTION IX. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

General cleanliness should be followed.

The Toxicology data indicate that ceramic fiber should be handled with caution. The handling practices described in this MSDS must be strictly followed. In particular, when handling refractory ceramic fiber in any application, special caution should be taken to avoid unnecessary cutting and tearing of the material to minimize generation of airborne dust.

It is recommended that full body clothing be worn to reduce the potential for skin irritation. Washable or disposable clothing may be used. Do not take unwashed work clothing home. Work clothes should be washed separately from other clothing. Rinse washing machine thoroughly after use. If clothing is to be laundered by someone else, inform launderer of proper procedure. Work clothes and street clothes should be kept separate to prevent contamination.

Product which has been in service at elevated temperatures (greater than 1800°F/982°C) may undergo partial conversion to cristobalite, a form of crystalline silica. This reaction occurs at the furnace lining hot face. As a consequence, this material becomes more friable; special caution must be taken to minimize generation of airborne dust. The amount of cristobalite present will depend on the temperature and length in service.

IARC has recently reviewed the animal, human, and other relevant experimental data on silica in order to critically evaluate and classify the cancer causing potential. Based on its review, IARC classified crystalline silica as a group 2A carcinogen (probable human carcinogen).

The OSHA permissible exposure limit (PEL for cristobalite is 0.05 mg/m³ (respirable dust). The ACGIH threshold limit value (TLV) for cristobalite is 0.05 mg/m³ (respirable dust) (ACGIH 1991-92). Use NIOSH or MSHA approved equipment when airborne exposure limits may be exceeded. The minimum respiratory protection recommended for given airborne fiber or cristobalite concentrations are:

CONCENTRATION

0-1 fiber/cc or 0-0.05 mg/m ³ cristobalite (the OSHA PEL)	Optional disposable dust respirator (e.g. 3M 9970 or equivalent).
Up to 5 fibers/cc or up to 10 times the OSHA PEL for cristobalite	Half face, air-purifying respirator equipped with high efficiency particulate air (HEPA) filter cartridges (e.g. 3M 6000 series with 2040 filter or equivalent).
Up to 25 fibers/cc or 50 times the OSHA PEL for cristobalite (2.5 mg/m ³)	Full face, air-purifying respirator with high efficiency particulate air (HEPA) filter cartridges (e.g. 3M 7800S with 7255 filters or equivalent) or powered air-purifying respirator (PARR) equipped with HEPA filter cartridges (e.g. 3M W3265S with W3267 filters or equivalent).
Greater than 25 fibers/cc or 50 times the OSHA PEL for cristobalite (2.5 mg/m ³)	Full face, positive pressure supplied air respirator (e.g. 3M 7800S with W9435 hose & W3196 low pressure regulator kit connected to clean air supply or equivalent).

If airborne fiber or cristobalite concentrations are not known, as minimum protection, use NIOSH/MSHA approved half face, air-purifying respirator with HEPA filter cartridges.

Insulation surface should be lightly sprayed with water before removal to suppress airborne dust. As water evaporates during removal, additional water should be sprayed on surfaces as needed. Only enough water should be sprayed to suppress dust so that water does not run onto the floor of the work area. To aid the wetting process, a surfactant can be used.

After RCF removal is completed, dust-suppressing cleaning methods, such as wet sweeping or vacuuming, should be used to clean the work area. If dry vacuuming is used, the vacuum must be equipped with HEPA filter. Air blowing or dry sweeping should not be used. Dust-suppressing components can be used to clean up light dust.

Product packaging may contain product residue. Do not reuse except to reship or return Ceramic Fiber products to the factory.

ESSENTIAL INSTRUCTIONS

READ THIS PAGE BEFORE PROCEEDING!

Rosemount Analytical designs, manufactures, and tests all its products to meet many national and international standards. Because these instruments are sophisticated technical products, you must properly install, use, and maintain them to ensure they continue to operate within their normal specifications. The following instructions must be adhered to and integrated into your safety program when installing, using, and maintaining Rosemount Analytical products. Failure to follow the proper instructions may cause any one of the following situations to occur: loss of life, personal injury, property damage, damage to the instrument, and warranty invalidation.

- Read all instructions prior to installing, operating, and servicing the product. If this Instruction Bulletin is not the correct manual, telephone 1-800-654-7768 and the required manual will be provided. Save this instruction manual for future reference.
- If you do not understand any of the instructions, contact your Rosemount representative for clarification.
- Follow all warnings, cautions, and instructions marked on and supplied with the product.
- Inform and educate your personnel in the proper installation, operation, and maintenance of the product.
- Install your equipment as specified in the installation instructions of the appropriate Instruction Bulletin and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.
- To ensure proper performance, use qualified personnel to install, operate, update, program, and maintain this product.
- When replacement parts are required, ensure that the qualified people use replacement parts specified by Rosemount. Unauthorized parts and procedures can affect the product's performance and place the safe operation of your process at risk. Look alike substitutions may result in fire, electrical hazards, or improper operation.
- Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.

CAUTION

If a Model 275 Universal HART® Communicator is used with this unit, the software within the Model 275 may require modification. If a software modification is required, please contact your local Fisher-Rosemount Service Group or National Response Center at 1-800-654-7768.

WHAT YOU NEED TO KNOW

BEFORE INSTALLING AND WIRING A ROSEMOUNT OXYMITTER 4000 OXYGEN TRANSMITTER

1. What type of installation does your system require?
Use the following drawing, Figure 1, to identify which type of installation is required for your Oxymitter 4000 system.

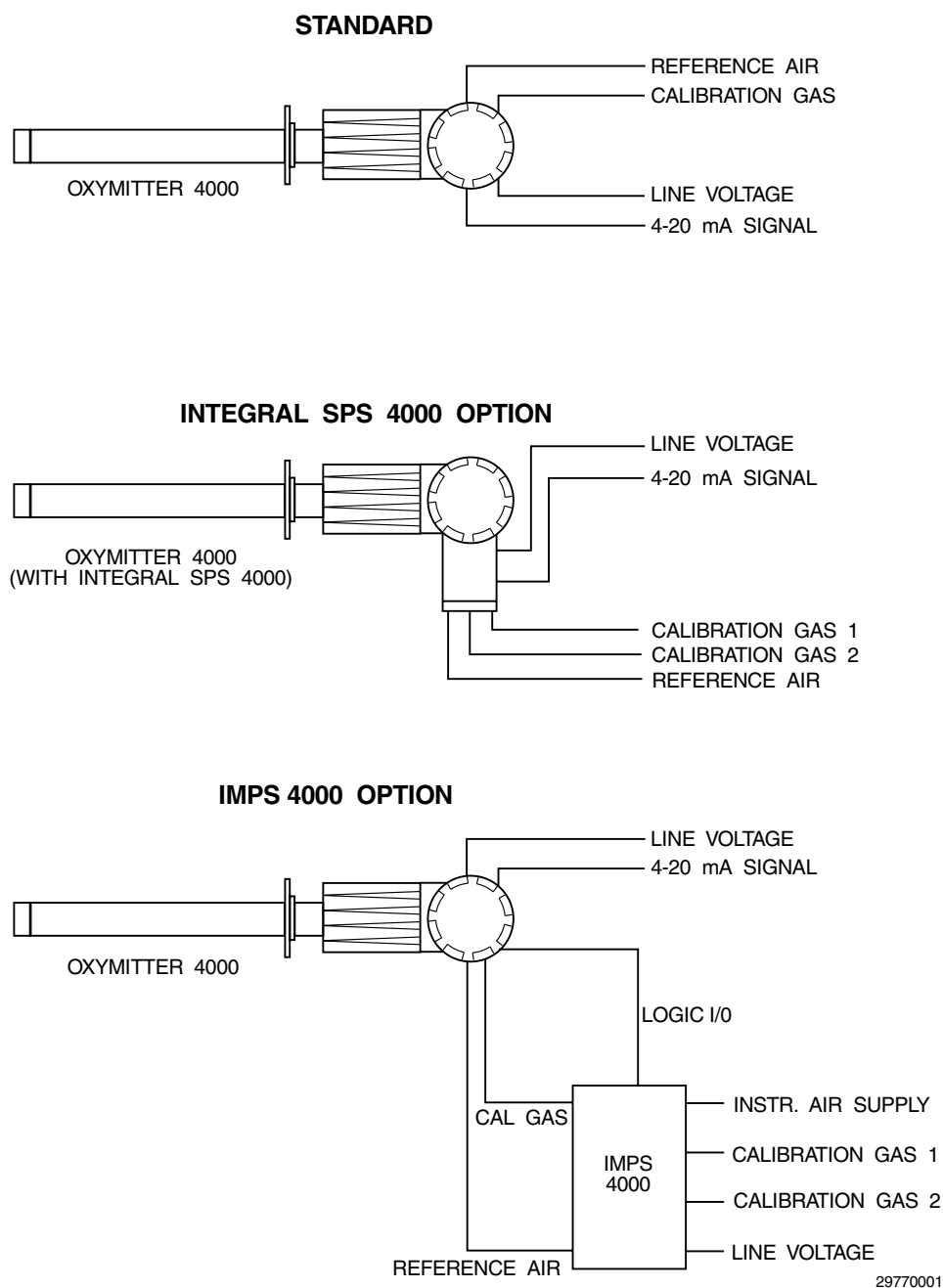


Figure 1. Oxymitter 4000 Installation Options

CAN YOU USE THE FOLLOWING QUICK START GUIDE?

Use the Quick Start Guide if

1. Your system requires a STANDARD or INTEGRAL SPS 4000 OPTION installation. Installation options for the Oxymitter 4000 are shown in Figure 1.
2. Your system does NOT require an IMPS 4000 OPTION installation.
3. You are familiar with the installation requirements for the Oxymitter 4000 Oxygen Transmitter. You are familiar with the installation requirements for the Oxymitter 4000 Oxygen Transmitter with an integral SPS 4000.

If you cannot use the Quick Start Guide, turn to Section II, Installation, in this Instruction Bulletin.

QUICK START GUIDE FOR OXYMITTER 4000 SYSTEMS

Before using the Quick Start Guide, please read “WHAT YOU NEED TO KNOW BEFORE INSTALLING AND WIRING A ROSEMOUNT OXYMITTER 4000 OXYGEN TRANSMITTER” on the preceding page.

1. Install the Oxymitter 4000 in an appropriate location on the stack or duct. Refer to Section II, paragraph 2-1.a for information on selecting a location for the Oxymitter 4000.
2. If using an SPS 4000, connect the calibration gasses to the appropriate fittings on the SPS 4000 manifold.
3. Connect reference air to the Oxymitter 4000 or SPS 4000, as applicable.
4. If using an SPS 4000, make the following wire connections as shown in Figure 2: line voltage, cal initiate-remote contact input, relay output, and 4-20 mA.
5. If NOT using an SPS 4000, make the following wire connections as shown in Figure 3: line voltage, 4-20 mA, and logic I/O.
6. Verify the Oxymitter 4000 switch configuration is as desired. Refer to Section III, paragraphs 3-1.c, 3-1.d, and 3-1.e.
7. Apply power to the Oxymitter 4000; the cell heater will turn on. Allow approximately one half hour for the cell to heat to operating temperature. Once the ramp cycle has completed and the Oxymitter 4000 is at normal operation, proceed with step 8.
8. If using an SPS 4000, initiate a semi-automatic calibration.
9. If NOT using an SPS 4000, perform a manual calibration. Refer to the QUICK REFERENCE GUIDE manual calibration instructions on the following pages, or Section VI, paragraph 6-2, Calibration, in this instruction bulletin.

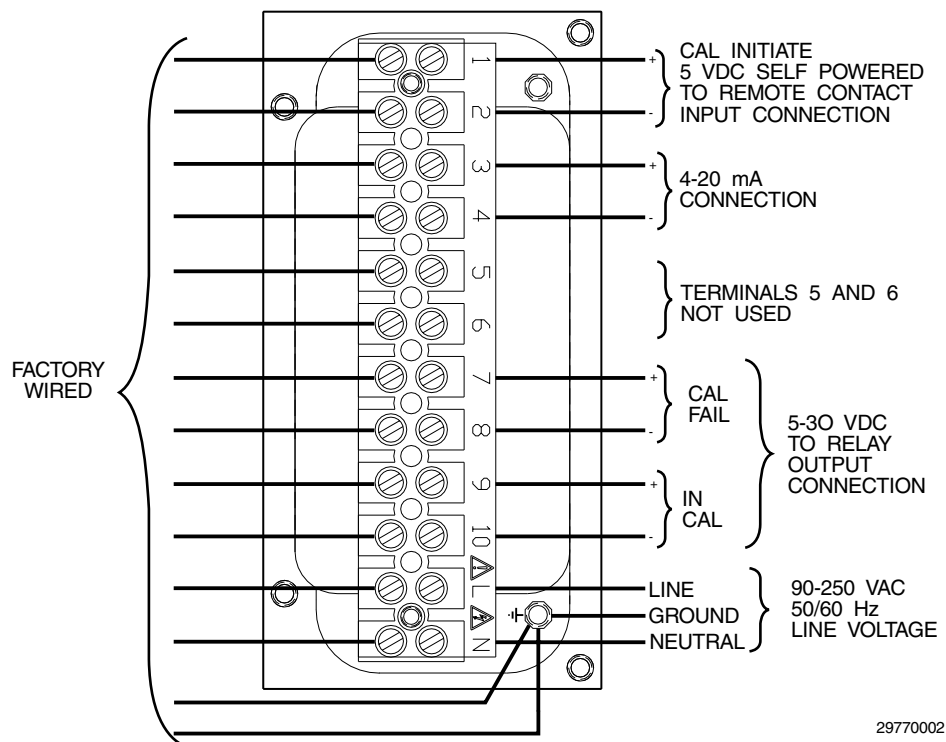


Figure 2. Oxymitter 4000 with SPS 4000 Wiring Diagram

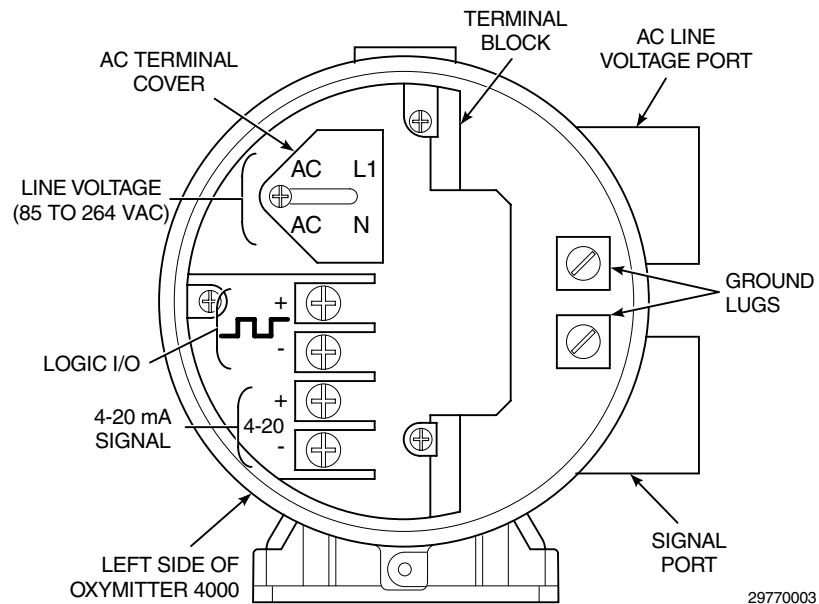


Figure 3. Oxymitter 4000 without SPS 4000 Wiring Diagram

QUICK REFERENCE GUIDE

OXYMITTER 4000 OXYGEN TRANSMITTER

Performing a Manual Calibration

1. Place the control loop in manual.
2. Press the CAL key. The CAL LED will light solid.
3. Apply the first calibration gas.
4. Press the CAL key. When the unit has taken the readings using the first calibration gas, the CAL LED will flash continuously.
5. Remove the first calibration gas and apply the second calibration gas.
6. Push the CAL key. The CAL LED will light solid. When the unit has taken the readings using the second calibration gas, the CAL LED will flash a two-pattern flash or a three-pattern flash. A two-pattern flash equals a valid calibration, three-pattern flash equals an invalid calibration.
7. Remove the second calibration gas and cap off the calibration gas port.
8. Press the CAL key. The CAL LED will be lit solid as the unit purges. When the purge is complete, the CAL LED will turn off.
9. If the calibration was valid, the DIAGNOSTIC ALARMS LEDs indicate normal operation. If the new calibration values are not within the parameters, the DIAGNOSTIC ALARMS LEDs will indicate an alarm.
10. Place the control loop in automatic.

HART COMMUNICATOR FAST KEY SEQUENCES

Perform Calibration

2	3	1	1
---	---	---	---

O₂ Upper Range Value

3	2	1
---	---	---

Trim Analog Output

2	4
---	---

Analog Output Lower Range Value

3	2	2
---	---	---

Toggle Analog Output Tracking

2	3	1	2
---	---	---	---

View O₂ Value

1	1	1
---	---	---

View Analog Output

1	2	1
---	---	---

Technical Support Hotline:

For assistance with technical problems, please call the Customer Support Center (CSC). The CSC is staffed 24 hours a day, 7 days a week.

Phone: 1-800-433-6076

In addition to the CSC, you may also contact Field Watch. Field Watch coordinates Rosemount's field service throughout the U.S. and abroad.

Phone: 1-800-654-RSMT (1-800-654-7768)

Rosemount may also be reached via the Internet through e-mail and the World Wide Web:

e-mail: GAS.CSC@frco.com

World Wide Web: www.processanalytic.com

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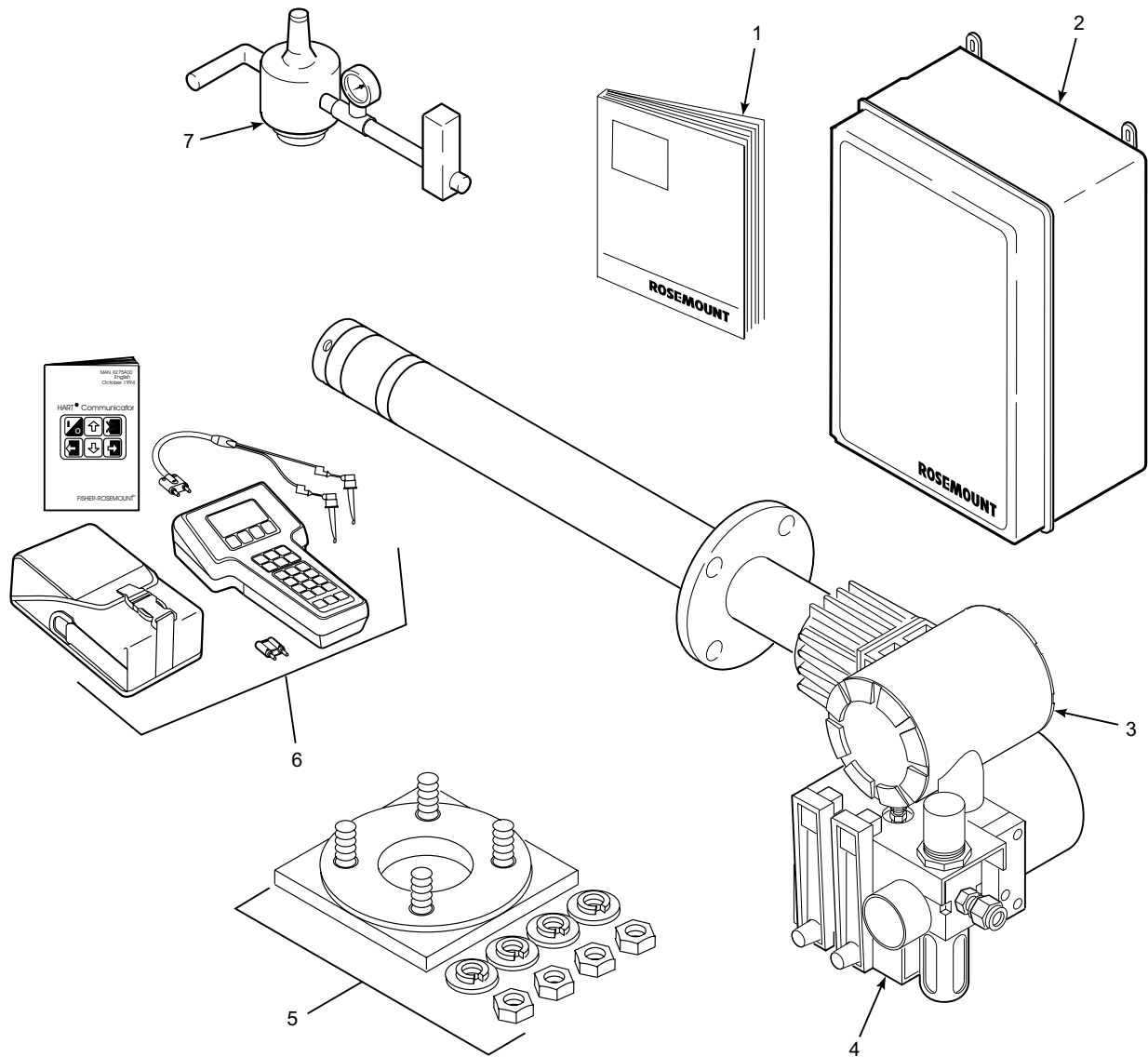
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26170008

ITEM	DESCRIPTION
1	Instruction Bulletin
2	IMPS 4000 Intelligent Multiprobe Test Gas Sequencer (Optional)
3	Oxymitter 4000 with Integral Electronics
4	SPS 4000 Single Probe Autocalibration Sequencer (Optional) - (Shown with reference air option)
5	Adapter Plate with Mounting Hardware and Gasket
6	HART® Communicator Package (Optional)
7	Reference Air Set (used if SPS 4000 without reference air option or IMPS 4000 not supplied)

Figure 1-1. Typical System Package

SECTION I. INTRODUCTION

1-1. COMPONENT CHECKLIST OF TYPICAL SYSTEM (PACKAGE CONTENTS).

A typical Rosemount Oxymitter 4000 Oxygen Transmitter should contain the items shown in Figure 1-1. Record the part number, serial number, and order number for each component of your system in the table located on the first page of this manual.

Also, use the product matrix in Table 1-1 at the end of this section to compare your order number against your unit. The first part of the matrix defines the model. The last part defines the various options and features of the Oxymitter 4000. Ensure the features and options specified by your order number are on or included with the unit.

1-2. SYSTEM OVERVIEW.

a. **Scope.** This Instruction Bulletin is designed to supply details needed to install, start up, operate, and maintain the Oxymitter 4000. Integral signal conditioning electronics outputs a 4-20 mA signal representing an O₂ value and provides a membrane keypad for setup, calibration, and diagnostics. This same information, plus additional details, can be accessed with the HART Model 275 handheld communicator or Asset Management Solutions (AMS) software.

b. **System Description.** The Oxymitter 4000 is designed to measure the net concentration of oxygen in an industrial process; i.e., the oxygen remaining after all fuels have been oxidized. The probe is permanently positioned within an exhaust duct or stack and performs its task without the use of a sampling system.

The equipment measures oxygen percentage by reading the voltage developed across a heated electrochemical cell, which consists of a small yttria-stabilized, zirconia disc. Both sides of the disc are coated with porous metal electrodes. When operated at the proper temperature, the millivolt output voltage of the cell is given by the following Nernst equation:

$$EMF = KT \log_{10}(P_1/P_2) + C$$

Where:

1. P₂ is the partial pressure of the oxygen in the measured gas on one side of the cell.
2. P₁ is the partial pressure of the oxygen in the reference air on the opposite side of the cell.
3. T is the absolute temperature.
4. C is the cell constant.
5. K is an arithmetic constant.

NOTE

For best results, use clean, dry, instrument air (20.95% oxygen) as the reference air.

When the cell is at operating temperature and there are unequal oxygen concentrations across the cell, oxygen ions will travel from the high oxygen partial pressure side to the low oxygen partial pressure side of the cell. The resulting logarithmic output voltage is approximately 50 mV per decade. The output is proportional to the inverse logarithm of the oxygen concentration. Therefore, the output signal increases as the oxygen concentration of the sample gas decreases. This characteristic enables the Oxymitter 4000 to provide exceptional sensitivity at low oxygen concentrations.

The Oxymitter 4000 measures net oxygen concentration in the presence of all the products of combustion, including water vapor. Therefore, it may be considered an analysis on a "wet" basis. In comparison with older methods, such as the portable apparatus, which provides an analysis on a "dry" gas basis, the "wet" analysis will, in general, indicate a lower percentage of oxygen. The difference will be proportional to the water content of the sampled gas stream.

c. **System Configuration.** Oxymitter 4000 units are available in five length options, giving the user the flexibility to use an in situ penetration appropriate to the size of the stack or duct. The options on length are 18 in. (457 mm), 3 ft (0.91 m), 6 ft (1.83 m), 9 ft (2.7 m), or 12 ft (3.66 m).

The integral electronics control probe temperature and provide an isolated output, 4-20 mA, that is proportional to the measured oxygen concentration. The power supply can accept voltages of 90-250 VAC and 50/60 Hz; therefore, no setup procedures are required. The oxygen sensing cell is maintained at a constant temperature by modulating the duty cycle of the probe heater portion of the integral electronics. The integral electronics accepts millivolt signals generated by the sensing cell and produces the outputs to be used by remotely connected devices. The output is an isolated 4-20 mA linearized current.

Two calibration gas sequencers are available to the Oxymitter 4000: the IMPS 4000 and the SPS 4000 (Figure 1-2).

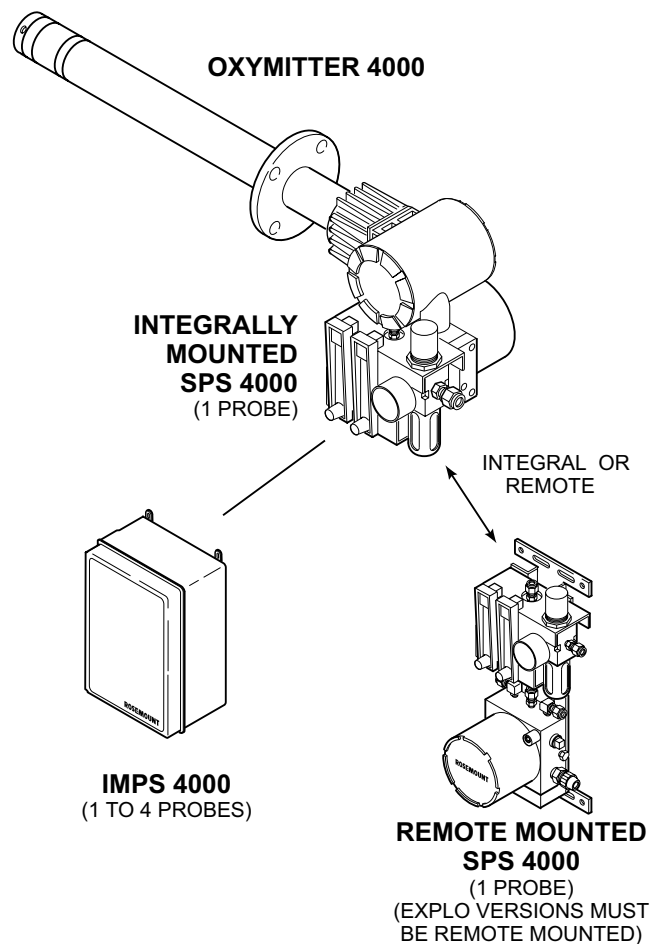
Systems with multiprobe applications may employ an optional IMPS 4000 Intelligent Multiprobe Test Gas Sequencer. The IMPS 4000 provides automatic calibration gas sequencing for up to four Oxymitter 4000 units and accommodates autocalibrations based on the CALIBRATION RECOMMENDED signal from the Oxymitter 4000, a timed interval set up in HART or the IMPS 4000, or whenever a calibration request is initiated.

For systems with one or two Oxymitter 4000 units per combustion process, an optional SPS 4000 Single Probe Autocalibration Sequencer can be used with each Oxymitter 4000 to provide automatic calibration gas sequencing. The SPS 4000 can be mounted directly to the Oxymitter 4000 or in a remote location if space is limited. The sequencer performs autocalibrations based on the CALIBRATION RECOMMENDED signal from the Oxymitter 4000, a timed interval set up in HART, or whenever a calibration request is initiated.

d. System Features.

1. The CALIBRATION RECOMMENDED feature detects when the sensing cell is likely out of limits. This may eliminate the need to calibrate on a “time since last cal” basis.
2. The cell output voltage and sensitivity increase as the oxygen concentration decreases.

3. Membrane keypad and HART communication are standard. To use the HART capability, you must have either:
 - (a) HART Model 275 Communicator.
 - (b) Asset Management Solutions (AMS) software for the PC.
4. Field replaceable cell, heater, thermocouple, and diffusion element.
5. The Oxymitter 4000 is constructed of rugged 316 L stainless steel for all wetted parts.



26170002

Figure 1-2. Oxymitter 4000 Autocalibration System Options

6. Integral electronics eliminates traditional wiring between probe and electronics.
7. The integral electronics are adaptable for line voltages from 90-250 VAC; therefore, no configuration is necessary.
8. The Oxymitter 4000 membrane keypad is available in five languages:
 - English
 - French
 - German
 - Italian
 - Spanish
9. An operator can calibrate and diagnostically troubleshoot the Oxymitter 4000 in one of three ways:
 - (a) Membrane Keypad. The membrane keypad, housed within the right side of the electronics housing, provides fault indication by way of flashing LEDs. Calibration can be performed from the membrane keypad.
 - (b) Optional HART Interface. The Oxymitter 4000's 4-20 mA output line transmits an analog signal proportional to the oxygen level. The HART output is superimposed on the 4-20 mA output line. This information can be accessed through the following:
 - 1 Rosemount Model 275 Handheld Communicator - The handheld communicator requires Device Description (DD) software specific to the Oxymitter 4000. The DD software will be supplied with many Model 275 units but can also be programmed into existing units at most Fisher-Rosemount service offices. See Section VII, HART/AMS, for additional information.
 - 2 Personal Computer (PC) - The use of a personal computer requires AMS software available from Fisher Rosemount.

- 3 Selected Distributed Control Systems - The use of distributed control systems requires input/output (I/O) hardware and AMS software which permit HART communications.

- (c) Optional IMPS 4000. The Programmable Logic Controller (PLC) in the IMPS 4000 provides fault indications using flashing LEDs and LCD display messages. Refer to the IMPS 4000 Intelligent Multiprobe Test Gas Sequencer Instruction Bulletin for more information.

10. The optional Rosemount 751 remote-mounted LCD display panel is loop-driven by the 4-20 mA output signal representing the O₂ percentage.

e. **Handling the Oxymitter 4000.**

CAUTION

It is important that printed circuit boards and integrated circuits are handled only when adequate antistatic precautions have been taken to prevent possible equipment damage.

The Oxymitter 4000 is designed for industrial applications. Treat each component of the system with care to avoid physical damage. Some probe components are made from ceramics, which are susceptible to shock when mishandled.

- f. **System Considerations.** Prior to installing your Oxymitter 4000, make sure you have all the components necessary to make the system installation. Ensure all the components are properly integrated to make the system functional.

After verifying that you have all the components, select mounting locations and determine how each component will be placed in terms of available line voltage, ambient temperatures, environmental considerations, convenience, and serviceability. Figure 1-3 shows a typical system wiring. A typical system installation is illustrated in Figure 1-4.

A source of instrument air is optional at the Oxymitter 4000 for reference air use. Since the unit is equipped with an in-place calibration feature, provisions can be made to permanently connect calibration gas tanks to the Oxymitter 4000.

If the calibration gas bottles will be permanently connected, a check valve is required next to the calibration fittings on the integral electronics.

This check valve is to prevent breathing of the calibration gas line and subsequent flue gas

condensation and corrosion. The check valve is in addition to the stop valve in the calibration gas kit or the solenoid valves in the IMPS 4000 or SPS 4000.

NOTE

The integral electronics is rated NEMA 4X (IP66) and is capable of operation at temperatures up to 149°F (65°C).

Retain the packaging in which the Oxymitter 4000 arrived from the factory in case any components are to be shipped to another site. This packaging has been designed to protect the product.

- 1-3. IMPS 4000 (OPTIONAL).** Information on the IMPS 4000 is available in the IMPS 4000 Intelligent Multiprobe Test Gas Sequencer Instruction Bulletin.

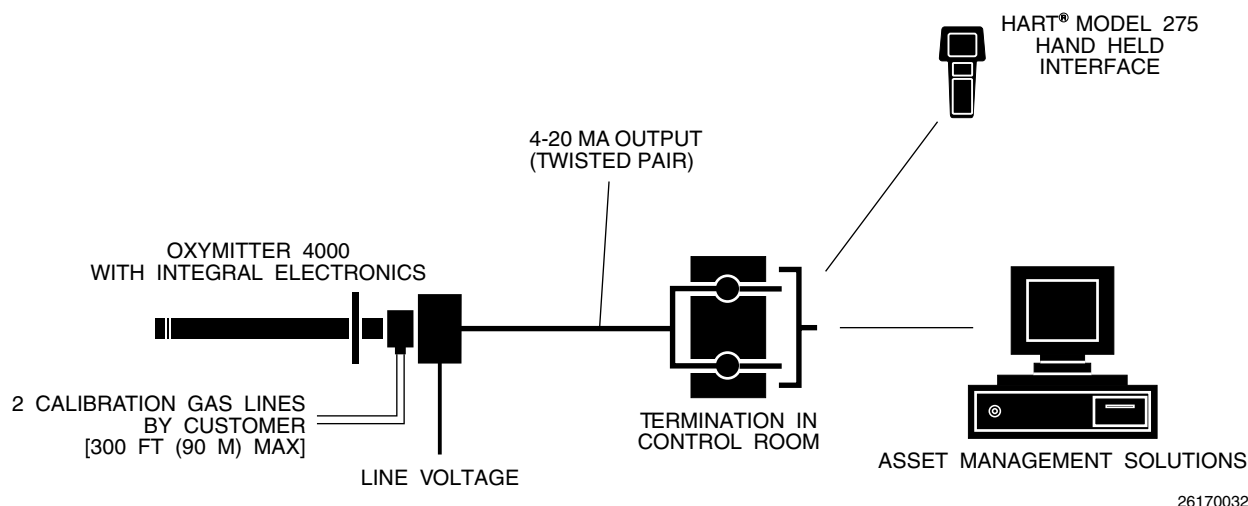
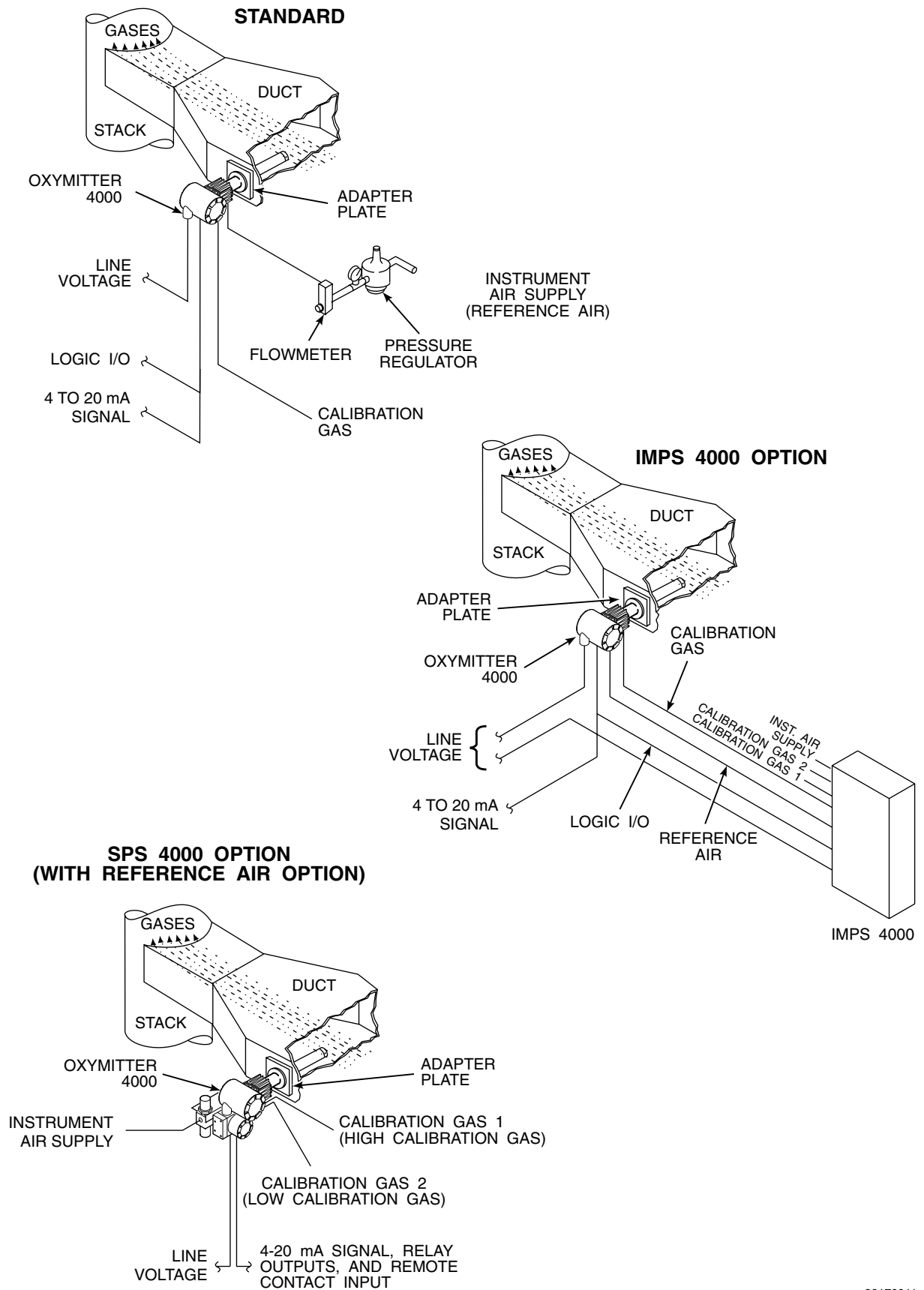


Figure 1-3. Oxymitter 4000 HART Connections and AMS Application



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Figure 1-4. Typical System Installation

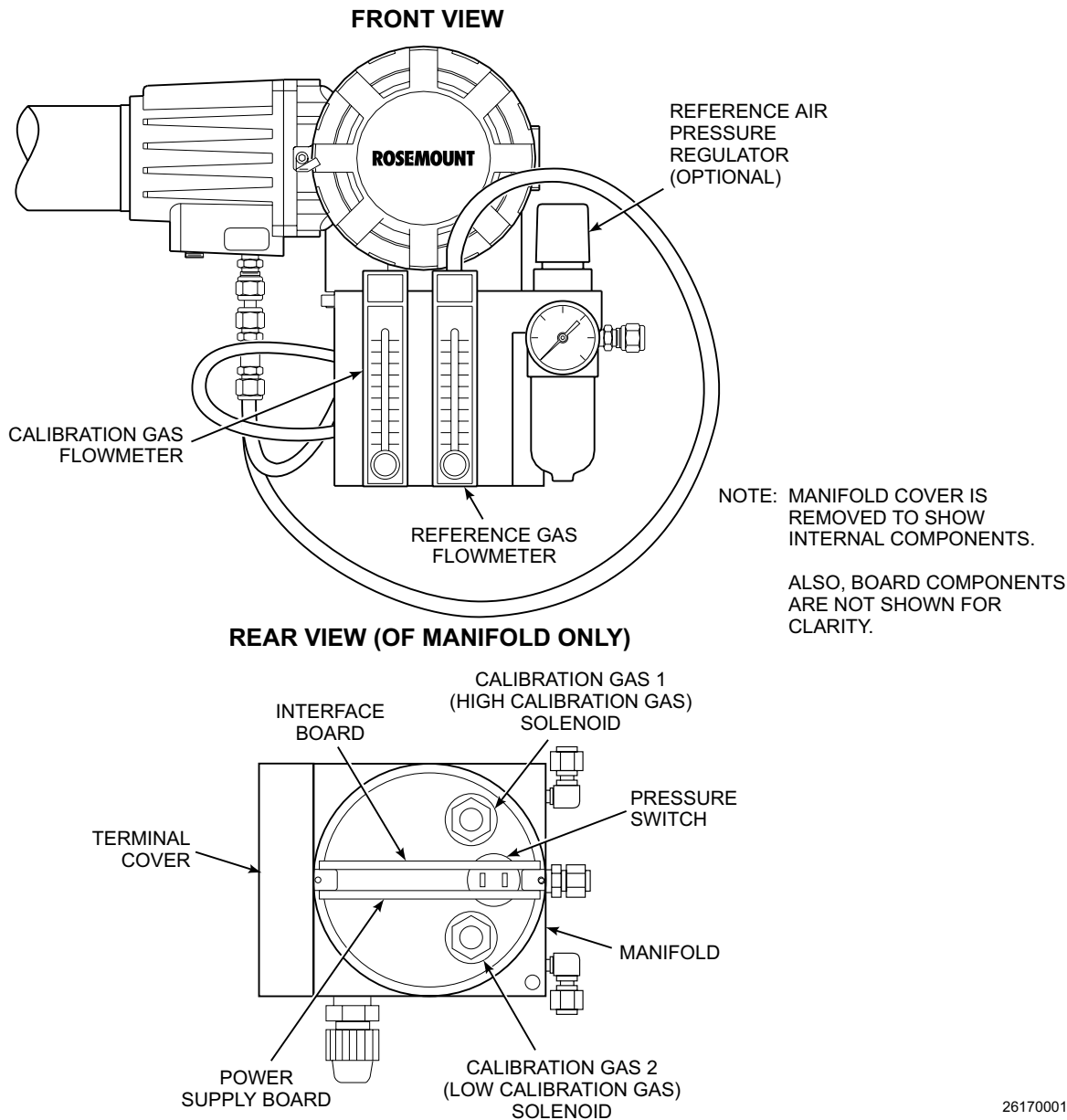


Figure 1-5. SPS 4000

1-4. SPS 4000 (OPTIONAL). The SPS 4000 Single Probe Autocalibration Sequencer provides the capability of performing automatic, timed or on demand, calibrations of a single Oxymitter 4000 without sending a technician to the installation site.

- a. **Mounting.** The SPS 4000 can be mounted either directly to an Oxymitter 4000 or at a remote location if space is limited. In addition, the integrally mounted SPS 4000 can be configured for a horizontally or vertically mounted Oxymitter 4000 (Figure 2-2). The information in this instruction bulletin will cover the integrally mounted units only. For information on remote mounted units, re-

fer to the SPS 4000 Single Probe Autocalibration Sequencer Instruction Bulletin.

- b. **Components (Figure 1-5).** The SPS 4000 consists of a manifold and a calibration gas flowmeter. The manifold provides electrical feedthroughs and calibration gas ports to route power and signal connections and calibration gases to and from the sequencer. In addition, the manifold houses two calibration gas solenoids that sequence the gases to the Oxymitter 4000, a pressure switch that detects low calibration gas pressure, and two PC boards. A terminal strip housed within the terminal cover provides convenient access for all user connections.

Components optional to the SPS 4000 include a reference air flowmeter and pressure regulator. The reference air flowmeter indicates the flow rate of reference air continuously flowing to the Oxymitter 4000. The reference air pressure regulator ensures the instrument air (reference air) flowing to the Oxymitter 4000 is at a constant pressure [20 psi (138 kPa)]. The regulator also has a filter to remove particulates in the reference air and a drain valve to bleed the moisture that collects in the filter bowl.

Brass fittings and Teflon tubing are standard. Stainless steel fittings and tubing are optional. Also, disposable calibration gas bottles are available as an option or can be purchased through a local supplier.

- c. **Operation.** The SPS 4000 works in conjunction with the Oxymitter 4000's CALIBRATION RECOMMENDED feature to perform an auto-calibration. This feature automatically performs a gasless calibration check every hour on the Oxymitter 4000. If a calibration is recommended and its contact output signal is set for "handshaking" with the sequencer, the Oxymitter 4000 sends a signal to the sequencer. The sequencer automatically performs a calibration upon receiving the signal. Thus, no human interface is required for the automatic calibration to take place.

1-5. MODEL 751 REMOTE POWERED LOOP LCD DISPLAY. The display provides a simple, economical means to obtain accurate, reliable, and remote indication of important process variables. This display operates on the 4-20 mA line from the Oxymitter 4000 (Figure 1-6).

Refer to Model 751 remote powered loop LCD manual for calibration and wiring.

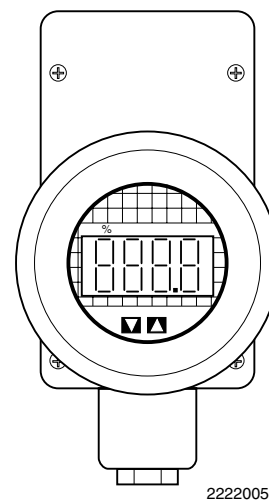


Figure 1-6. Model 751 Remote Powered Loop LCD Display

1-6. SPECIFICATIONS.

Oxymitter 4000

O₂ Range:

Standard 0 to 10% O₂
0 to 25% O₂
0 to 40% O₂ (via HART)

Accuracy ±0.75% of reading or 0.05% O₂, whichever is greater

System Response to Calibration Gas Initial response in less than 3 seconds
T90 in less than 8 seconds

Temperature Limits:

Process 32° to 1300°F (0° to 704°C) up to 2400°F (1300°C) with optional accessories

Electronics -40° to 185°F (-40° to 85°C)
Operating temperature of electronics inside of instrument housing, as measured by a HART communicator or Rosemount Asset Management Solutions software.

Probe Lengths 18 in. (457 mm)
3 ft (0.91 m)
6 ft (1.83 m)
9 ft (2.74 m)
12 ft (3.66 m)

Mounting and Mounting Position Vertical or horizontal
Spool pieces are available, P/N 3D39761G02, to offset transmitter housing from hot ductwork.

Materials:

Probe Wetted or welded parts - 316L stainless steel
Non-wetted parts - 304 stainless steel, low-copper aluminum

Electronics Enclosure Low-copper aluminum

Calibration Manual, semi-automatic, or automatic

Calibration Gas Mixtures Recommended 0.4% O₂, Balance N₂
8% O₂, Balance N₂

Calibration Gas Flow 5 scfh (2.5 l/m)

Reference Air 2 scfh (1 l/m), clean, dry, instrument-quality air
(20.95% O₂), regulated to 5 psi (34 kPa)

Electronics NEMA 4X, IP66 with fitting and pipe on reference exhaust port to clear dry atmosphere

Electronic Noise Meets EN 50082-2 Generic Immunity Std. Part II.
Includes EN 61000-4-2 for Electrostatic Discharge
4 KV contact, 8 KV in air
Includes IEC 801-4 for fast transients; 2 KV on power supply and control lines

Line Voltage 90-250 VAC, 50/60 Hz. No configuration necessary
3/4 in. - 14 NPT conduit port

Signals:

Analog Output/HART 4-20 mA isolated from power supply, 950 ohms maximum load

Logic I/O Two-terminal logic contact configurable as either an alarm output or as a bi-directional calibration handshake signal to IMPS 4000 or SPS 4000
Self-powered (+5 V), in series with 340 ohms
Conduit ports — 3/4 in.-14 NPT (one threaded hole for both analog output and logic I/O)

Oxymitter 4000, Continued

Power Requirements:

Probe Heater	175 W nominal
Electronics	10 W nominal
Maximum	500 W

SPS 4000

Mounting	Integral to Oxymitter 4000 Remote from Oxymitter 4000
----------------	--

Materials of Construction:

Manifold/Electronics Enclosure	Aluminum
Mounting Brackets	316 stainless steel (SS)
Pneumatic Fittings	1/8 in. brass NPT (SS optional)
Pneumatic Tubing	1/4 in. Teflon (SS optional)
Assembly Hardware	Galvanized and stainless steel
Humidity Range	100% relative humidity
Ambient Temperature Range	-40° to 149°F (-40° to 65°C)
Electrical Classification	NEMA 4X (IP56)
Explosion-Proof Option (both pending)	CENELEC EExd IIB + H2 (Class 1, Div. 1, Group B,C,D)
Electrical Feedthroughs	1/2 in. NPT
Input Power	90 to 250 VAC, 50/60 Hz
Power Consumption	5 VA maximum
External Electrical Noise	EN 50 082-2, includes 4 KV electrostatic discharge
Handshake Signal to/from Oxymitter 4000 (self-powered)	5 V (5 mA maximum)
Cal Initiate Contact Input from Control Room	5 VDC (self-powered)
Relay Outputs to Control Room	5 to 30 VDC, Form A (SPST) (one “In-Cal”, one “Cal Failed”)
Cabling Distance between SPS 4000 and Oxymitter 4000	Maximum 1000 ft (303 m)
Piping Distance between SPS 4000 and Oxymitter 4000	Maximum 300 ft (91 m)
Approximate Shipping Weight	10 lbs (4.5 kg)



Fisher-Rosemount has satisfied all obligations coming from the European legislation to harmonize the product requirements in Europe.

Table 1-1. Product Matrix.

OXT4A	Oxymitter 4000 In Situ Oxygen Transmitter																												
Oxygen Transmitter - Instruction Book																													
<table><tr><td>Code</td><td>Sensing Probe Type</td></tr><tr><td>1</td><td>ANSI (N. American Std.) Probe with Ceramic Diffuser</td></tr><tr><td>2</td><td>ANSI Probe with Flame Arrestor and Ceramic Diffuser</td></tr><tr><td>3</td><td>ANSI Probe with Snubber Diffuser</td></tr><tr><td>4</td><td>DIN (European Std.) Probe with Ceramic Diffuser</td></tr><tr><td>5</td><td>DIN Probe with Flame Arrestor and Snubber Diffuser</td></tr><tr><td>6</td><td>DIN Probe with Snubber Diffuser</td></tr><tr><td>7</td><td>JIS (Japanese Std.) Probe with Ceramic Diffuser</td></tr><tr><td>8</td><td>JIS Probe with Flame Arrestor and Ceramic Diffuser</td></tr><tr><td>9</td><td>JIS Probe with Snubber Diffuser</td></tr></table>								Code	Sensing Probe Type	1	ANSI (N. American Std.) Probe with Ceramic Diffuser	2	ANSI Probe with Flame Arrestor and Ceramic Diffuser	3	ANSI Probe with Snubber Diffuser	4	DIN (European Std.) Probe with Ceramic Diffuser	5	DIN Probe with Flame Arrestor and Snubber Diffuser	6	DIN Probe with Snubber Diffuser	7	JIS (Japanese Std.) Probe with Ceramic Diffuser	8	JIS Probe with Flame Arrestor and Ceramic Diffuser	9	JIS Probe with Snubber Diffuser		
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<table><tr><td>Code</td><td>Probe Assembly</td></tr><tr><td>0</td><td>18 in. (457 mm) Probe</td></tr><tr><td>1</td><td>18 in. (457 mm) Probe with Abrasive Shield⁽¹⁾</td></tr><tr><td>2</td><td>3 ft (0.91 m) Probe</td></tr><tr><td>3</td><td>3 ft (0.91 m) Probe with Abrasive Shield⁽¹⁾</td></tr><tr><td>4</td><td>6 ft (1.83 m) Probe</td></tr><tr><td>5</td><td>6 ft (1.83 m) Probe with Abrasive Shield⁽¹⁾</td></tr><tr><td>6</td><td>9 ft (2.74 m) Probe</td></tr><tr><td>7</td><td>9 ft (2.74 m) Probe with Abrasive Shield⁽¹⁾</td></tr><tr><td>8</td><td>12 ft (3.66 m) Probe⁽¹⁾</td></tr><tr><td>9</td><td>12 ft (3.66 m) Probe with Abrasive Shield⁽¹⁾</td></tr></table>								Code	Probe Assembly	0	18 in. (457 mm) Probe	1	18 in. (457 mm) Probe with Abrasive Shield ⁽¹⁾	2	3 ft (0.91 m) Probe	3	3 ft (0.91 m) Probe with Abrasive Shield ⁽¹⁾	4	6 ft (1.83 m) Probe	5	6 ft (1.83 m) Probe with Abrasive Shield ⁽¹⁾	6	9 ft (2.74 m) Probe	7	9 ft (2.74 m) Probe with Abrasive Shield ⁽¹⁾	8	12 ft (3.66 m) Probe ⁽¹⁾	9	12 ft (3.66 m) Probe with Abrasive Shield ⁽¹⁾
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<table><tr><td>Code</td><td>Electronics Housing & Filtered Customer Termination - NEMA 4X, IP66</td></tr><tr><td>11</td><td>Standard Filtered Termination</td></tr><tr><td>12</td><td>Transient Protected Filtered Termination</td></tr></table>								Code	Electronics Housing & Filtered Customer Termination - NEMA 4X, IP66	11	Standard Filtered Termination	12	Transient Protected Filtered Termination																
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<table><tr><td>Code</td><td>Communications</td></tr><tr><td>1</td><td>HART with Membrane Keypad</td></tr></table>								Code	Communications	1	HART with Membrane Keypad																		
Code	Communications																												
1	HART with Membrane Keypad																												
OXT4A	3	2	1	1	11	1	(Cont'd)	Example																					

Table 1-1. Product Matrix (Continued).

Cont'd	Code	Language	
	1	English	
	2	German	
	3	French	
	4	Spanish	
	5	Italian	
		Code	Filtered Customer Termination
		00	Specified as Part of Electronics Housing
		Code	Calibration Accessories
		00	No Hardware
		01	Calibration Gas Flowmeter and Reference Air Set
		02	Intelligent Multiprobe Sequencer (Refer to Table 1-3)
		XX	Single Probe Sequencer - mounted to Oxymitter 4000 (Refer to Table 1-4)
Cont'd	1	00	XX
			Example

NOTES:

⁽¹⁾ Recommended usages: High velocity particulates in flue stream, installation within 11.5 ft (3.5 m) of soot blowers or heavy salt cake buildup. Applications: Pulverized coal, recovery boilers, lime kiln. Regardless of application, abrasive shields with support brackets are recommended for 9 ft (2.74 m) and 12 ft (3.66 m) probe installations, particularly horizontal installations.

⁽²⁾ Where possible, specify SPS number; otherwise, provide details of the existing mounting plate as follows:

Plate with studs	Bolt circle diameter, number, and arrangement of studs, stud thread, stud height above mounting plate.
Plate without studs	Bolt circle diameter, number, and arrangement of holes, thread, depth of stud mounting plate with accessories.

Table 1-2. Calibration Components.

PART NUMBER	DESCRIPTION
1A99119G01	Two disposable calibration gas bottles — 0.4% and 8% O ₂ , balance nitrogen — 550 liters each, includes bottle rack*
1A99119G02	Two flow regulators for calibration gas bottles

*Calibration gas bottles cannot be shipped via airfreight.

When the bottles are used with “CALIBRATION RECOMMENDED” features, the bottles should provide 2 to 3 years of calibrations in normal service.

Table 1-3. Intelligent Multiprobe Test Gas Sequencer Versions.

PART NUMBER	DESCRIPTION	NUMBER OF OXYMITTER 4000 UNITS
3D39695G01	IMPS	1
3D39695G02	IMPS	2
3D39695G03	IMPS	3
3D39695G04	IMPS	4
3D39695G05	IMPS w/115 V Heater	1
3D39695G06	IMPS w/115 V Heater	2
3D39695G07	IMPS w/115 V Heater	3
3D39695G08	IMPS w/115 V Heater	4
3D39695G09	IMPS w/220 V Heater	1
3D39695G10	IMPS w/220 V Heater	2
3D39695G11	IMPS w/220 V Heater	3
3D39695G12	IMPS w/220 V Heater	4

Table 1-4. Single Probe Autocalibration Sequencer Coding.

CODE	REF AIR SET		FITTINGS/ TUBING		OXYMITTER 4000 MOUNTING	
	NO	YES	BRASS/ TEFLON	ST STEEL	HOR	VERT
03	X		X		X	
04		X	X		X	
05	X			X	X	
06		X		X	X	
07	X		X			X
08		X	X			X
09	X			X		X
10		X		X		X

SECTION II. INSTALLATION

WARNING

Before installing this equipment, read the “Safety instructions for the wiring and installation of this apparatus” at the front of this Instruction Bulletin. Failure to follow the safety instructions could result in serious injury or death.

2-1. MECHANICAL INSTALLATION.

a. Selecting Location.

1. The location of the Oxymitter 4000 in the stack or flue is most important for maximum accuracy in the oxygen analyzing process. The Oxymitter 4000 must be positioned so the gas it measures is representative of the process. Best results are normally obtained if the Oxymitter 4000 is positioned near the center of the duct (40-60% insertion). Longer ducts may require several Oxymitter 4000 units since the O₂ can vary due to stratification. A point too near the wall of the duct, or the inside radius of a bend, may not provide a representative sample because of the very low flow conditions. The sensing point should be selected so the process gas temperature falls within a range of 32° to 1300°F (0° to 704°C). Figures 2-1 through 2-6 provide mechanical installation references. The ambient temperature of the integral electronics housing must not exceed 149°F (65°C).
2. Check the flue or stack for holes and air leakage. The presence of this condition will substantially affect the accuracy of the oxygen reading. Therefore, either make the necessary repairs or install the Oxymitter 4000 upstream of any leakage.

3. Ensure the area is clear of internal and external obstructions that will interfere with installation and maintenance access to the membrane keypad. Allow adequate clearance for removal of the Oxymitter 4000 (Figure 2-1 or 2-2).

CAUTION

Do not allow the temperature of the Oxymitter 4000 integral electronics to exceed 149°F (65°C) or damage to the unit may result.

b. Installation.

1. Ensure all components are available to install the Oxymitter 4000. If equipped with the optional ceramic diffusion element, ensure it is not damaged.
2. The Oxymitter 4000 may be installed intact as it is received.

NOTE

An abrasive shield is recommended for high velocity particulates in the flue stream (such as those in coal-fired boilers, kilns, and recovery boilers). Vertical and horizontal brace clamps are provided for 9 ft and 12 ft (2.75 m and 3.66 m) probes to provide mechanical support for the Oxymitter 4000. Refer to Figure 2-6.

3. Weld or bolt adapter plate (Figure 2-5) onto the duct.

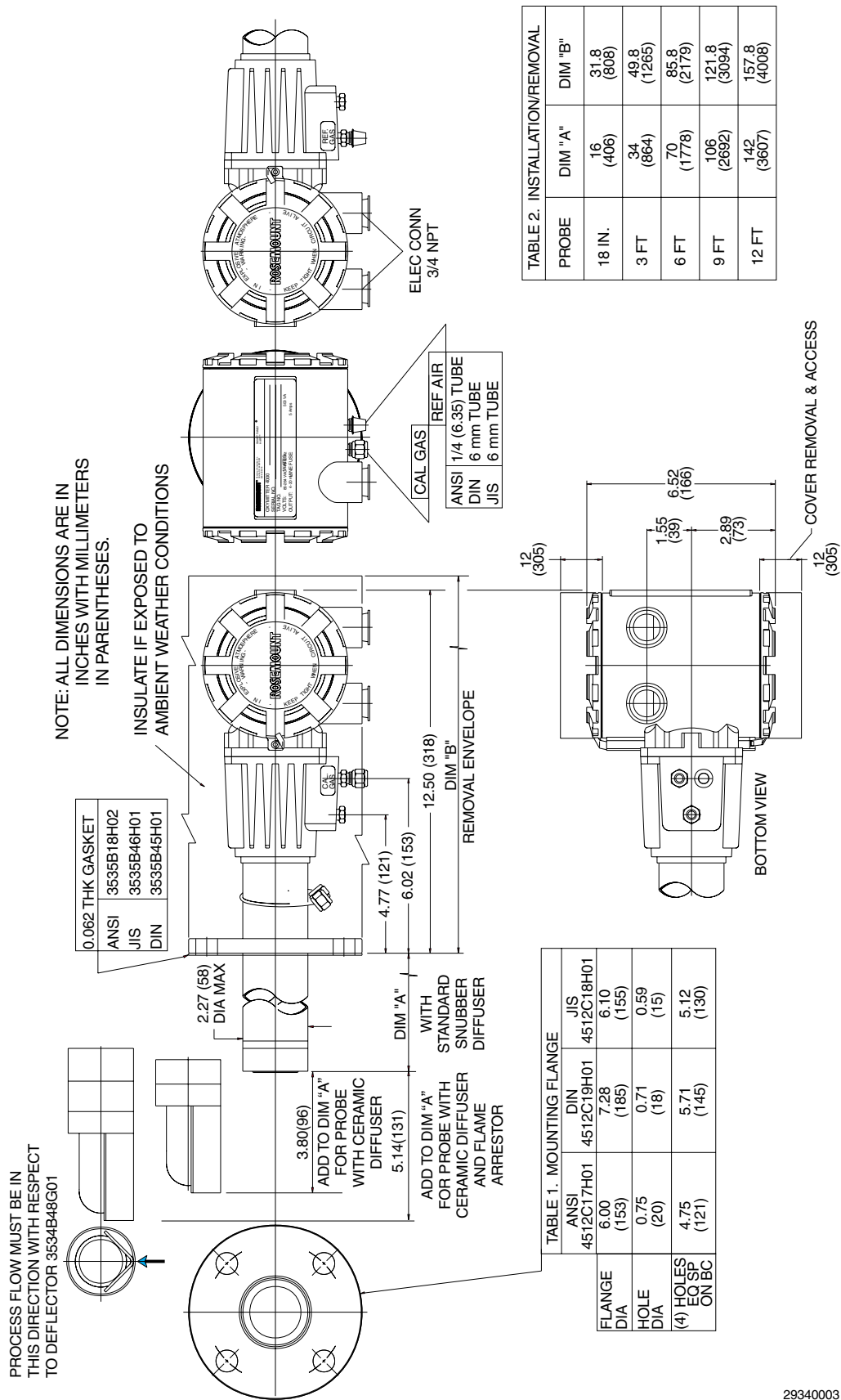
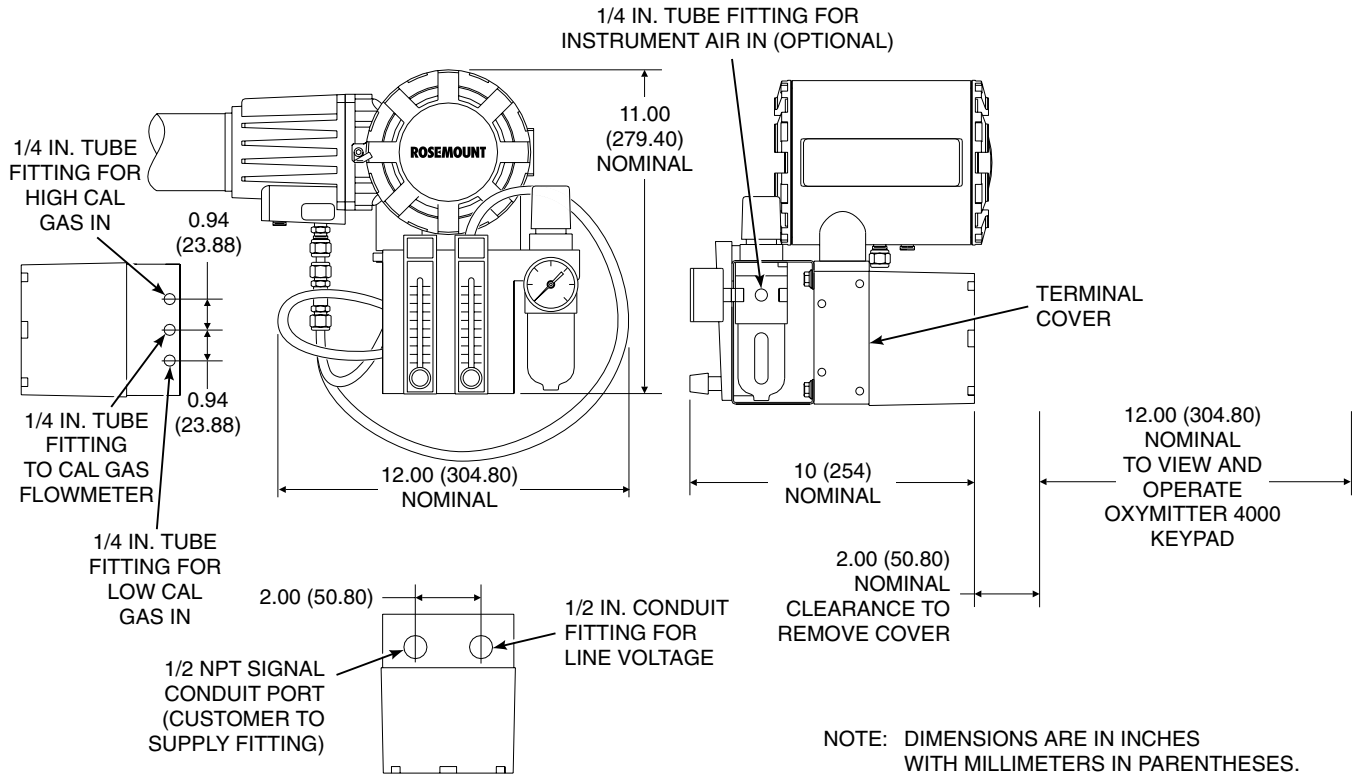
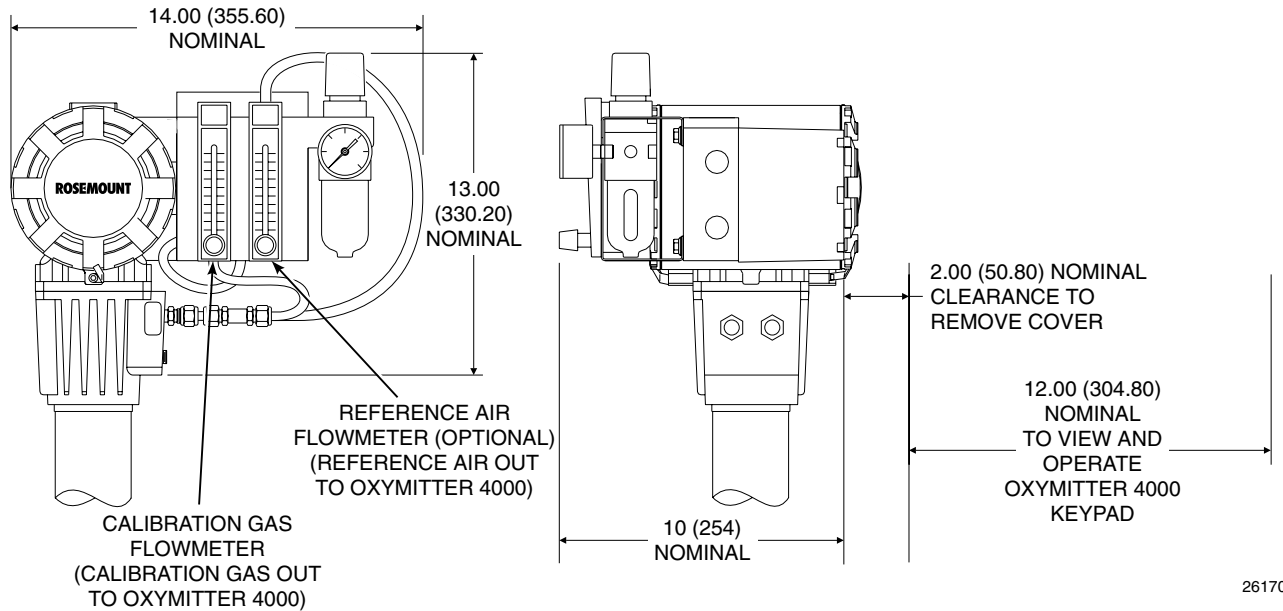


Figure 2-1. Oxymitter 4000 Installation

HORIZONTAL MOUNTED SPS 4000 A



VERTICAL MOUNTED SPS 4000 A



26170003

Figure 2-2. Oxymitter 4000 Installation (with SPS 4000)

- NOTES:
1. THESE FLAT-FACED FLANGES ARE MANUFACTURED TO ANSI, DIN, AND JIS BOLT PATTERNS AND ARE NOT PRESSURE RATED.
 2. ALL DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

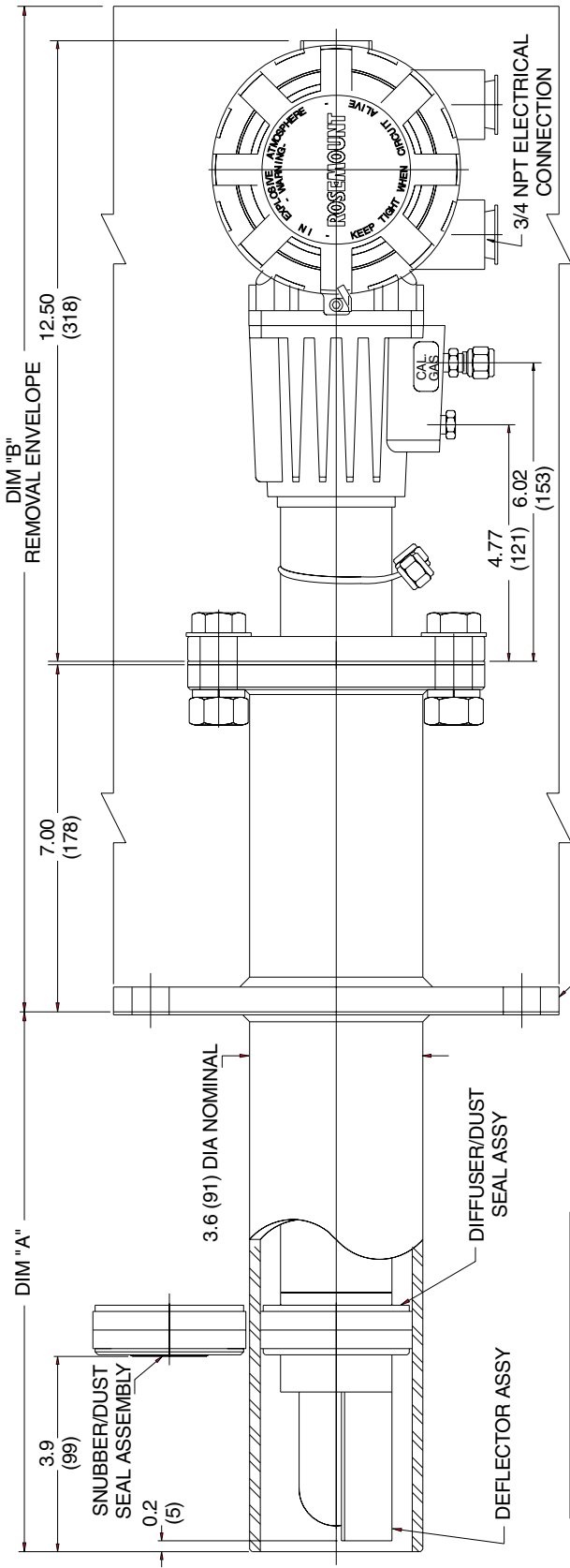


TABLE 3. INSTALLATION/REMOVAL TABLE			
PROBE	DIM "A"	DIM "B"	
3 FT	31 (787)	50.5 (1283)	
6 FT	67 (1702)	86.5 (2197)	
9 FT	103 (2616)	122.5 (3112)	
12 FT	139 (3531)	158.5 (4026)	

TABLE 4. ABRASIVE SHIELD -3D39003			
FLANGE	ANSI	JIS	DIN
FLANGE DIA	9.00 (229)	9.25 (235)	9.25 (235)
HOLE DIA	0.75 (19)	0.75 (19)	0.94 (24)
(8) HOLES EQ SP ON BC	7.50 (190)	7.48 (190)	7.48 (190)

CAL GAS*	
REF AIR	
ANSI	1/4 IN. TUBE
ANSI	6 mm TUBE
ANSI	6 mm TUBE

*ADD CHECK VALVE IN CAL GAS LINE

Figure 2-3. Oxymitter 4000 with Abrasive Shield

29340001

ADAPTER PLATE OUTLINE

DIMENSIONS IN. (mm)	ANSI (P/N 4512C34G01)	DIN (P/N 4512C36G01)	JIS (P/N 4512C35G01)
"A"	6.00 (153)	7.5 (191)	6.50 (165)
"B" THREAD	0.625-11	(M-16 x 2)	(M-12 x 1.75)
"C" DIA	4.75 (121)	5.708 (145)	5.118 (130)

*PART NUMBERS FOR ADAPTER PLATES INCLUDE ATTACHING HARDWARE.

DIMENSIONS IN. (mm)	ANSI (P/N 3535B58G02)	DIN (P/N 3535B58G06)	JIS (P/N 3535B58G04)
"A"	9.00 (229)	9.25 (235)	9.25 (235)
"B" DIA	4.75 (121)	3.94 (100)	4.92 (125)
"C" THREAD	0.625-11	(M-16 x 2)	(M-20 x 2.5)
"D" DIA	7.50 (191)	7.48 (190)	7.894 (200)

*PART NUMBERS FOR ADAPTER PLATES INCLUDE ATTACHING HARDWARE.

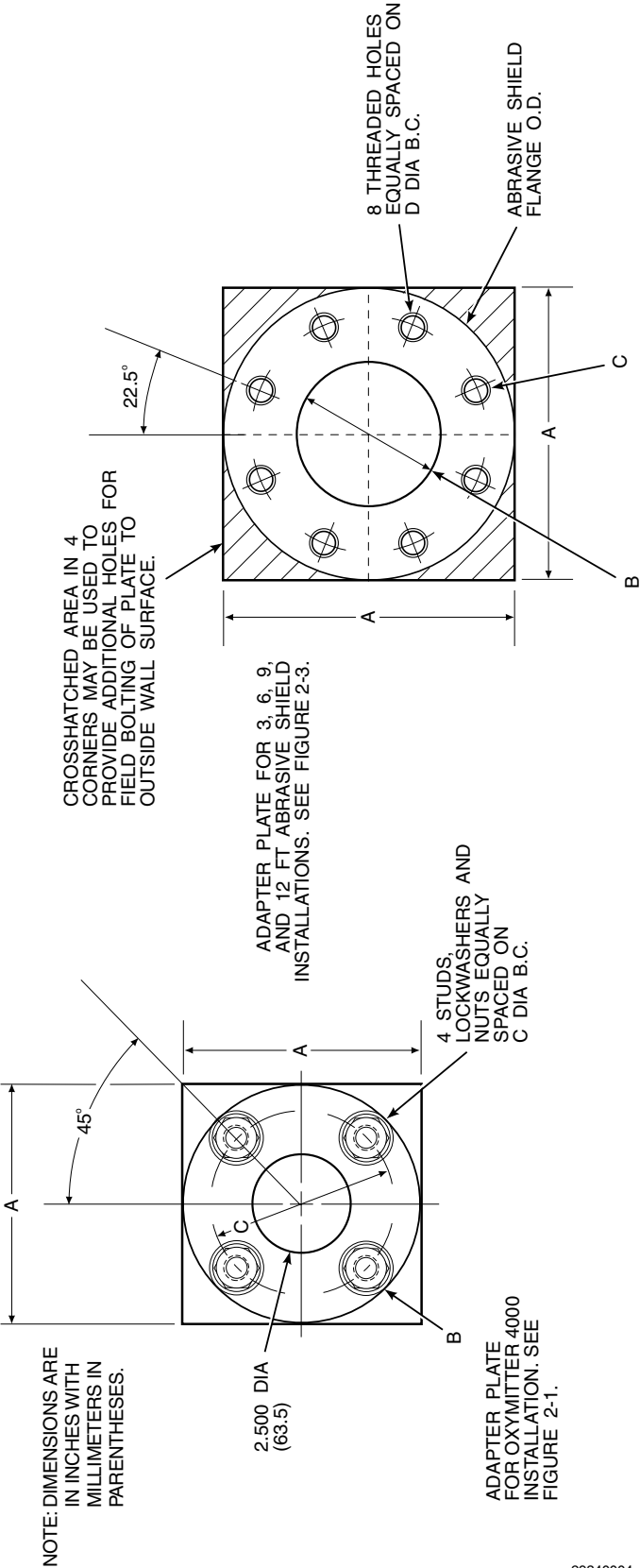
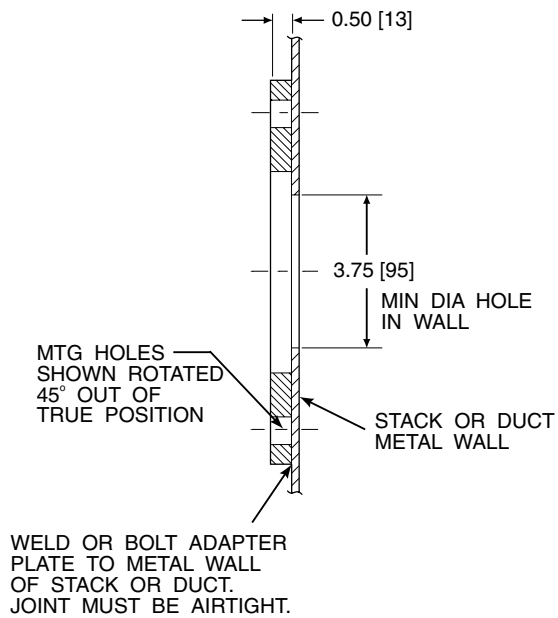
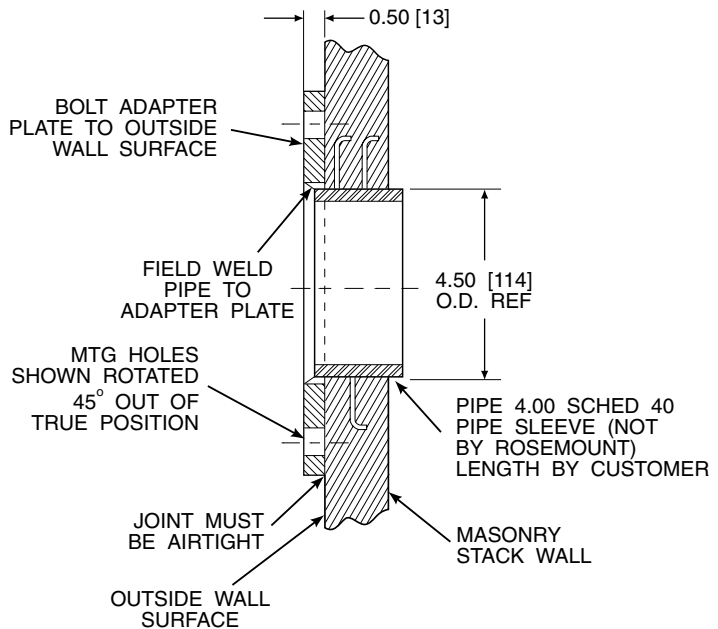


Figure 2-4. Oxymitter 4000 Adapter Plate Dimensions

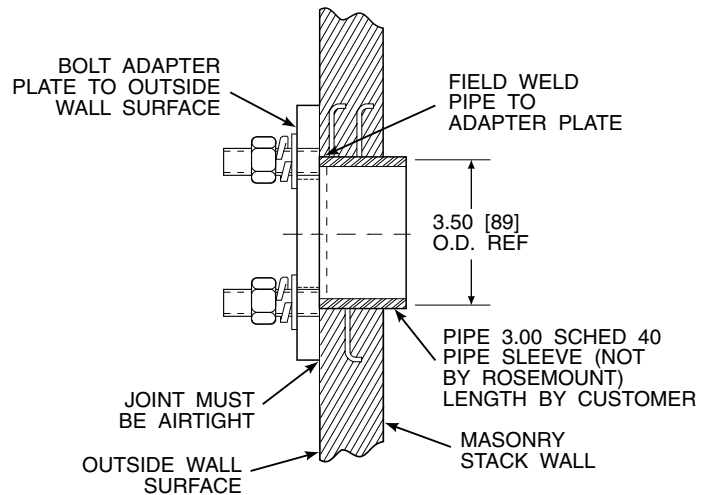
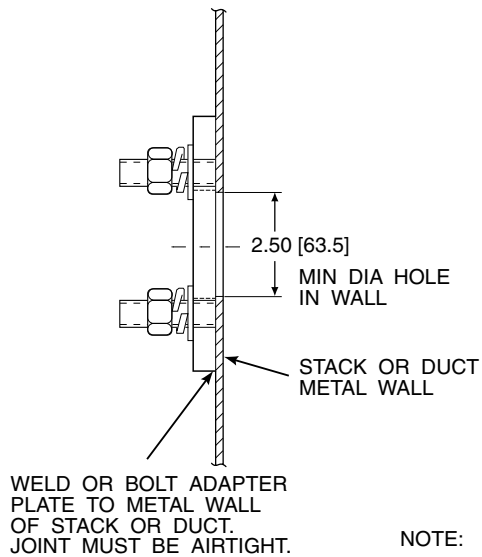
INSTALLATION FOR METAL WALL STACK OR DUCT CONSTRUCTION



INSTALLATION FOR MASONRY WALL STACK CONSTRUCTION



NOTE: ALL MASONRY STACK WORK AND JOINTS EXCEPT ADAPTER PLATE NOT FURNISHED BY ROSEMOUNT.



NOTE: DIMENSIONS IN INCHES WITH MILLIMETERS IN PARENTHESES.

29340002

Figure 2-5. Oxymitter 4000 Adapter Plate Installation

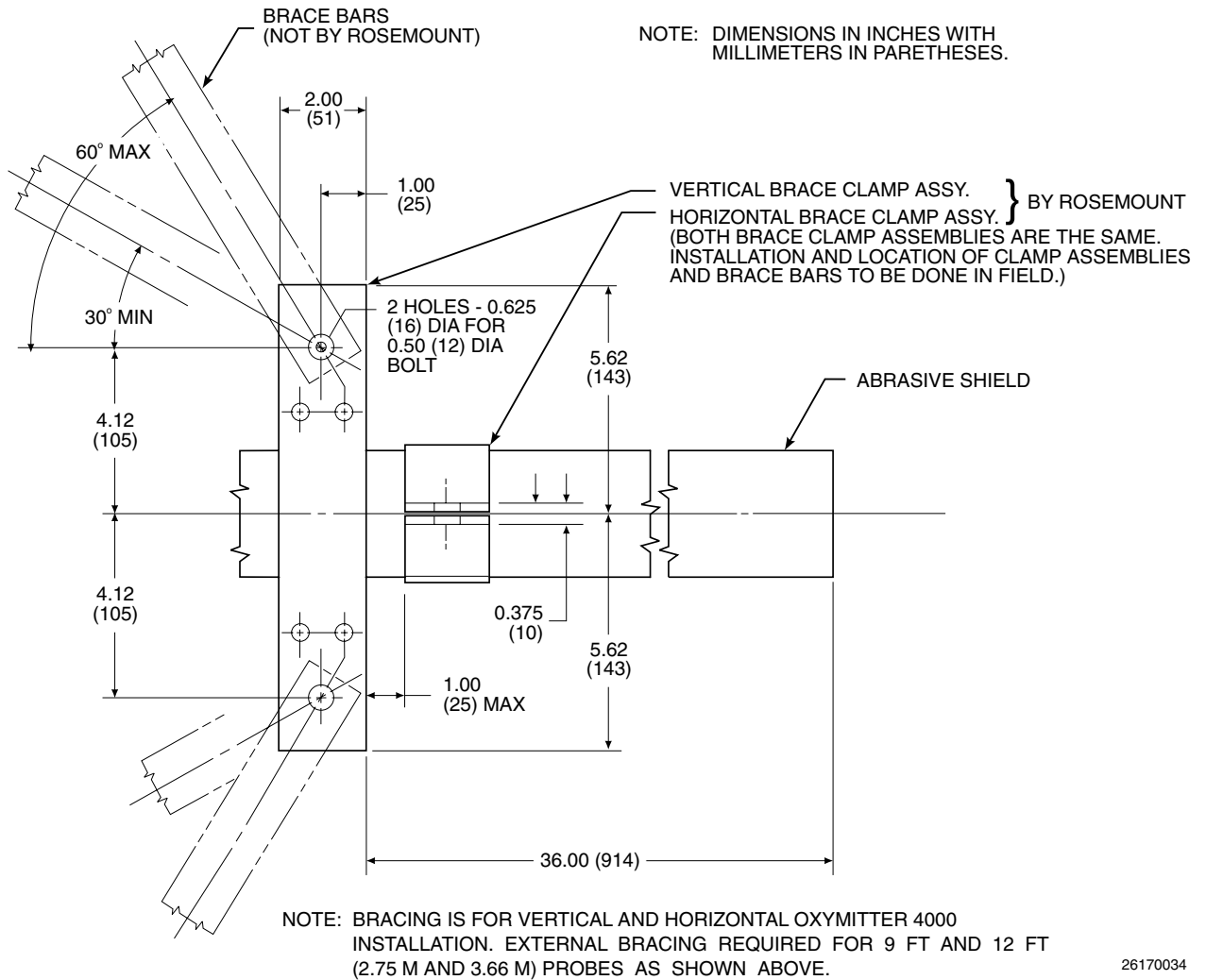


Figure 2-6. Oxymitter 4000 Bracing Installation

4. If using the optional ceramic diffusion element, the vee deflector must be correctly oriented. Before inserting the Oxymitter 4000, check the direction of gas flow in the duct. Orient the vee deflector so the apex points upstream toward the flow (Figure 2-7). This may be done by loosening the setscrews and rotating the vee deflector to the desired position. Retighten the setscrews.
5. In vertical installations, ensure the system cable drops vertically from the Oxymitter 4000 and the conduit is routed below the level of the electronics housing. This drip loop minimizes the possibility that moisture will damage the electronics (Figure 2-8).

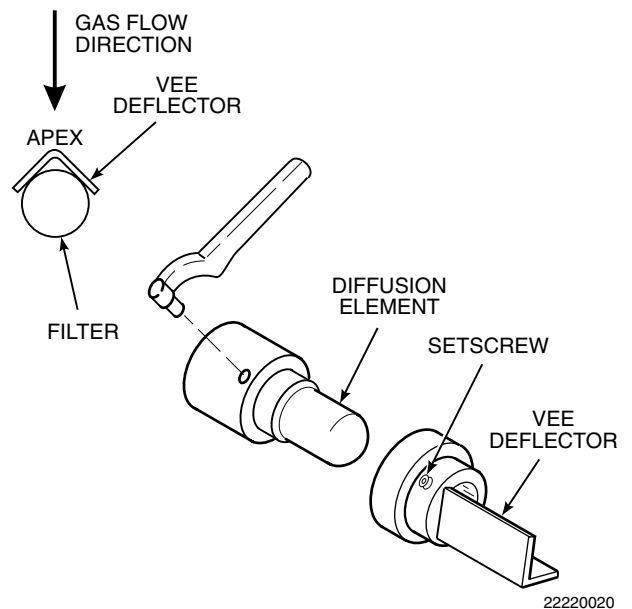
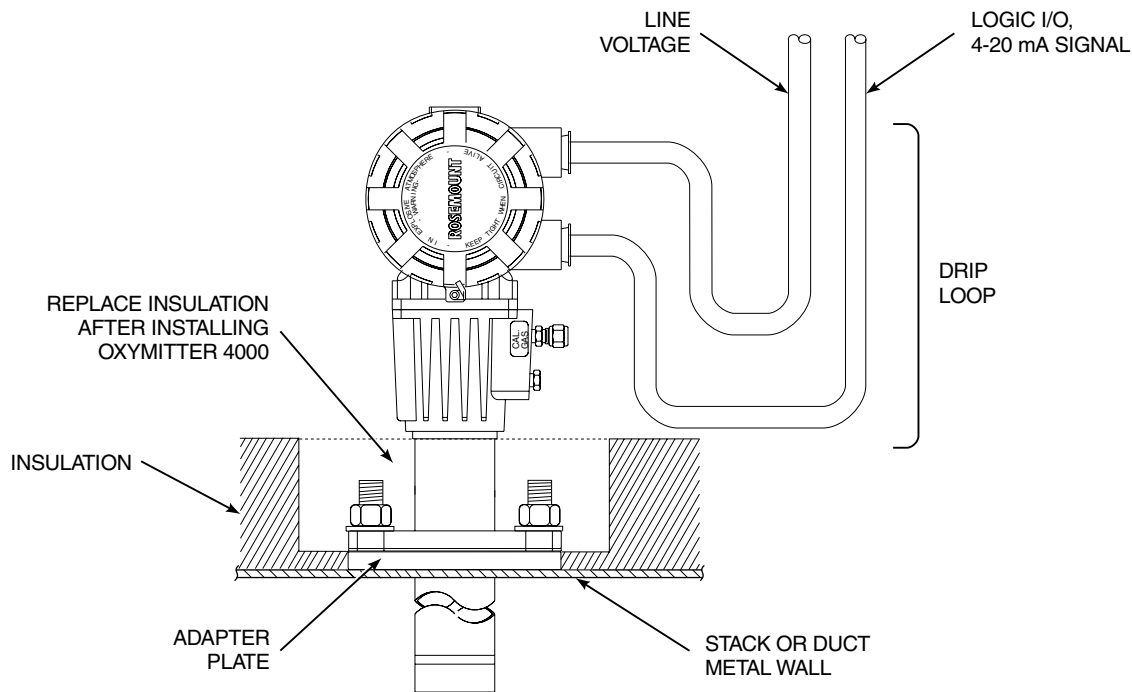


Figure 2-7. Orienting the Optional Vee Deflector



29340005

Figure 2-8. Installation with Drip Loop and Insulation Removal

6. If the system has an abrasive shield, check the dust seal gaskets. The joints in the two gaskets must be staggered 180°. Also, make sure the gaskets are in the hub grooves as the Oxymitter 4000 slides into the 15° forcing cone in the abrasive shield.

NOTE

If process temperatures will exceed 392°F (200°C), use anti-seize compound on stud threads to ease future removal of Oxymitter 4000.

7. Insert probe through the opening in the mounting flange and bolt the unit to the flange. When probe lengths selected are 9 or

12 ft (2.74 or 3.66 m), special brackets are supplied to provide additional support for the probe inside the flue or stack (Figure 2-6).

CAUTION

Uninsulated stacks or ducts may cause ambient temperatures around the electronics to exceed 149°F (65°C), which may cause overheating damage to the electronics.

8. If insulation is being removed to access the duct work for Oxymitter 4000 mounting, make sure the insulation is replaced afterward (Figure 2-8).

2-2. ELECTRICAL INSTALLATION (FOR OXYMITTER 4000 WITHOUT SPS 4000). All wiring must conform to local and national codes.

WARNING

Disconnect and lock out power before connecting the unit to the power supply.

WARNING

Install all protective equipment covers and safety ground leads after installation. Failure to install covers and ground leads could result in serious injury or death.

WARNING

To meet the Safety Requirements of IEC 1010 (EC requirement), and ensure safe operation of this equipment, connection to the main electrical power supply must be made through a circuit breaker (min 10 A) which will disconnect all current-carrying conductors during a fault situation. This circuit breaker should also include a mechanically operated isolating switch. If not, then another external means of disconnecting the supply from the equipment should be located close by. Circuit breakers or switches must comply with a recognized standard such as IEC 947.

NOTE

To maintain CE compliance, ensure a good connection exists between the mounting flange bolts and earth.

- a. Remove screw (32, Figure 6-1), gasket (33), and cover lock (34). Remove terminal block cover (27).
- b. **Connect Line Voltage.** Connect the line, or L1, wire to the L1 terminal and the neutral, or L2 wire, to the N terminal (Figure 2-9). The Oxymitter 4000 automatically will configure itself for 90-250 VAC line voltage and 50/60 Hz. The power supply requires no setup.
- c. **Connect 4-20 mA Signal and Logic I/O/Calibration Handshake Leads (Figure 2-9).**
 1. 4-20 mA Signal. The 4-20 mA signal represents the O₂ value and can also operate the Model 751 Remote Powered Loop LCD Display or any other loop powered display. Superimposed on the 4-20 mA signal is HART information that is accessible through a Model 275 Handheld Communicator or AMS software.
 2. Logic I/O/Calibration Handshake. The output can either be an alarm or provide the handshaking to interface with an IMPS 4000. For more information, refer to paragraph 5-3 and the IMPS 4000 Intelligent Multiprobe Test Gas Sequencer Instruction Bulletin.
 3. If autocalibration is not utilized, a common bi-directional logic contact is provided for any of the diagnostic alarms listed in

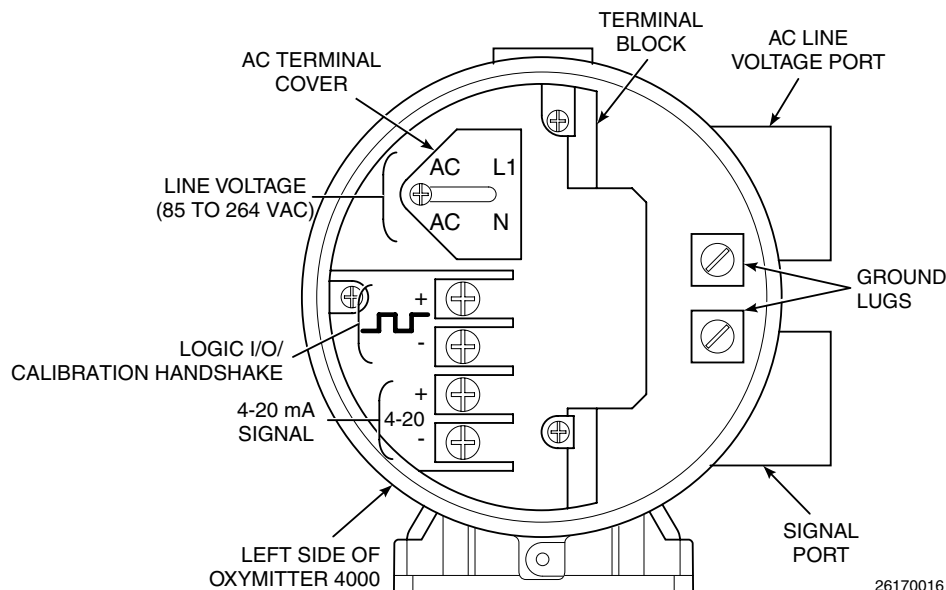


Figure 2-9. Terminal Block

Table 5-1. The assignment of alarms which can actuate this contact can be modified to one of seven additional groupings listed in Table 3-1.

The logic contact is self-powered, +5 VDC, 340 ohm series resistance. An interposing relay will be required if this contact is to be utilized to annunciate a higher voltage device, such as a light or horn, and may also be required for certain DCS input cards. A Potter & Brumfield R10S-E1Y1-J1.0K 3.2 mA DC or an equal interposing relay will be mounted where the contact wires terminate in the control/relay room.

- d. Install terminal block cover (27, Figure 6-1) and secure with cover lock (34), gasket (33), and screw (32).

2-3. ELECTRICAL INSTALLATION (FOR OXYMITTER 4000 WITH SPS 4000). All wiring must conform to local and national codes.

WARNING

Disconnect and lock out power before connecting the unit to the power supply.

WARNING

Install all protective equipment covers and safety ground leads after installation. Failure to install covers and ground leads could result in serious injury or death.

WARNING

To meet the Safety Requirements of IEC 1010 (EC requirement), and ensure safe operation of this equipment, connection to the main electrical power supply must be made through a circuit breaker (min 10 A) which will disconnect all current-carrying conductors during a fault situation. This circuit breaker should also include a mechanically operated isolating switch. If not, then another external means of disconnecting the supply from the equipment should be located close by. Circuit breakers or switches must comply with a recognized standard such as IEC 947.

Autocalibration systems will inject gases into the probe and make electronic adjustments with no operator attention required. The SPS 4000 provides solenoid valves and circuitry for calibrating a single Oxymitter 4000 unit.

The SPS 4000 autocalibration system utilizes the Oxymitter 4000's bidirectional logic contact as a "handshake" signal. Therefore, this signal is not available for alarming purposes.

The following contacts are provided through the autocalibration system:

- a. One contact closure per probe from the control room to the SPS 4000 for "calibration initiate".
- b. One contact output per probe from the SPS 4000 to the control room for "in calibration" notification.
- c. One contact per probe from the SPS 4000 to the control room for "calibration failed" notification, which includes output from pressure switch indicating "cal gas bottles empty".

NOTE

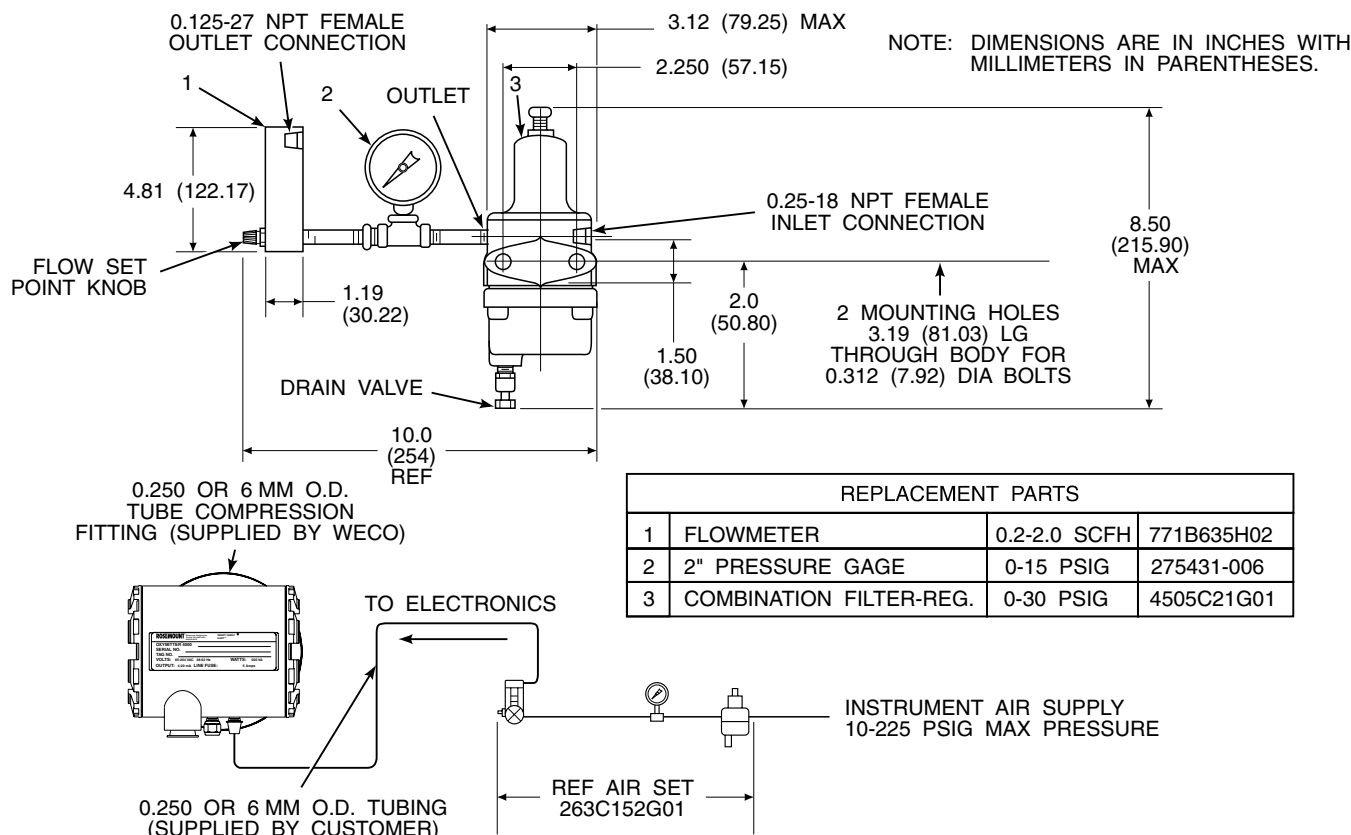
The 4-20 mA signal can be configured to respond normally during any calibration, or can be configured to hold the last O₂ value upon the initiation of calibration. Factory default is for the 4-20 mA signal to operate normally throughout calibration. Holding the last O₂ value may be useful if several probes are being averaged for the purpose of automatic control. Unless several probes are being averaged, always place any control loops using the O₂ signal into manual prior to calibrating.

Electrically connect the probe as follows:

- a. Remove screws (26, Figure 6-11) securing terminal cover (27). Remove the cover to expose terminal strip (25).
- b. **Connect Line Voltage.** Route the line voltage leads into the manifold through the 1/2 in. line voltage conduit fitting (Figure 2-2) and out through the bottom of the manifold. Connect the LINE IN and NEUTRAL leads to terminals L and N, respectively, as shown in Figure 2-10. Also, be sure to connect the ground wire to the ground lug. The unit automatically will configure itself for 90 to 250 VAC line voltage and 50/60 Hz. The power supply requires no setup.

- The cabling requirement is 1000 ft (303 m) maximum. Route the relay output leads through the 1/2 in. NPT signal conduit port (Figure 2-2) and out through the bottom of the manifold. Connect the (+) and (-) CAL FAIL leads and the (+) and (-) IN CAL leads to terminals 7, 8, 9, and 10, respectively, as shown in Figure 2-10.
- e. **Connect 4-20 mA Signal Wiring.** Route the 4-20 mA signal wiring into the manifold through the 1/2 in. NPT signal conduit port (Figure 2-2) and out through the bottom of the manifold. Connect the (+) and (-) signal leads to terminals 3 and 4, respectively, as shown in Figure 2-10.
- f. Once all connections are made, install terminal cover (27, Figure 6-11) and secure with screws (26).





SCHEMATIC HOOKUP FOR REFERENCE AIR SUPPLY ON OXYMITTER 4000 PROBE HEAD.

26170035

Figure 2-11. Air Set, Plant Air Connectio

2-4. PNEUMATIC INSTALLATION (FOR OXYMITTER 4000 WITHOUT SPS 4000).

- a. **Reference Air Package.** After the Oxymitter 4000 is installed, connect the reference air set to the Oxymitter 4000. The reference air set should be installed in accordance with Figure 2-11.

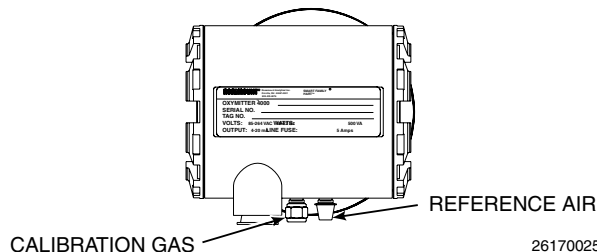
Instrument Air (Reference Air): 10 psig (68.95 kPag) minimum, 225 psig (1551.38 kPag) maximum at 2 scfh (56.6 L/hr) maximum; less than 40 parts-per-million total hydrocarbons. Regulator outlet pressure should be set at 5 psi (35 kPa). Reference air can be supplied by the reference air set of the IMPS 4000.

If using an IMPS 4000, refer to the IMPS 4000 Intelligent Multiprobe Test Gas Sequencer Instruction Bulletin for the proper reference air connections.

CAUTION

Do not use 100% nitrogen as a low gas (zero gas). It is suggested that gas for the low (zero) be between 0.4% and 2.0% O₂. Do not use gases with hydrocarbon concentrations of more than 40 parts per million. Failure to use proper gases will result in erroneous readings.

- b. **Calibration Gas.** Two calibration gas concentrations are used with the Oxymitter 4000, Lo Gas - 0.4% O₂ and High Gas - 8% O₂. See Figure 2-12 for the Oxymitter 4000 connections.



26170025

Figure 2-12. Oxymitter 4000 Gas Connections

2-5. PNEUMATIC INSTALLATION (FOR OXYMITTER 4000 WITH SPS 4000).

CAUTION

Do not use 100% nitrogen as a low gas (zero gas). It is suggested that gas for the low (zero) be between 0.4% and 2.0% O₂. Do not use gases with hydrocarbon concentrations of more than 40 parts per million. Failure to use proper gases will result in erroneous readings.

- a. **Calibration Gas Connections.** Locate the 1/4 in. calibration gas fittings on the SPS 4000 manifold (Figure 2-2). Connect O₂ calibration gas 1 (high calibration gas) to the HIGH CAL GAS IN fitting and O₂ calibration gas 2 (low

calibration gas) to the LOW CAL GAS IN fitting. Ensure the calibration gas pressure is set at 20 psi (138 kPa).

- b. **Reference Air Connection (Optional).** If the reference air option (which includes the reference air flowmeter, pressure regulator, and necessary tubing and fittings) is used, connect the instrument air to the 1/4 in. fitting on the reference air pressure regulator (Figure 2-2). The pressure regulator is factory set at 20 psi (138 kPa). Re-adjust by turning the knob on the top of the regulator to obtain the desired pressure.

If the SPS 4000 does not have the reference air option, connect the reference air to the Oxymitter 4000 as instructed in paragraph 2-4.



NOTE

Upon completing installation, make sure that the Oxymitter 4000 is turned on and operating prior to firing up the combustion process. Damage can result from having a cold Oxymitter 4000 exposed to the process gases.

During outages, and if possible, leave all Oxymitter 4000 units running to prevent condensation and premature aging from thermal cycling.

CAUTION

If the ducts will be washed down during outage, MAKE SURE to power down the Oxymitter 4000 units and remove them from the wash area.

SECTION III. STARTUP

WARNING

Install all protective equipment covers and safety ground leads before equipment startup. Failure to install covers and ground leads could result in serious injury or death.

3-1. GENERAL.

a. **Verify Mechanical Installation.** Ensure the Oxymitter 4000 is installed correctly (Section II, INSTALLATION).

b. **Verify Terminal Block Wiring.**

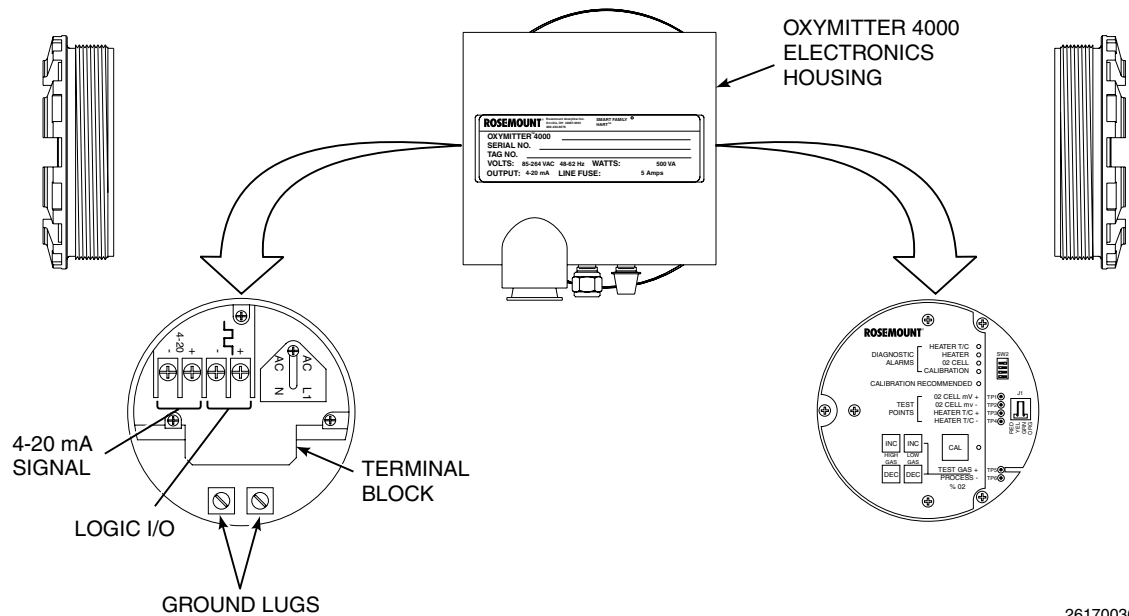
1. Remove screw (32, Figure 6-1), gasket (33), and cover lock (34) that secure the terminal block cover. Remove the cover to expose the terminal block (Figure 3-1).

2. Check the terminal block wiring. Be sure the power, 4-20 mA signal, and logic outputs are properly connected and secure.

3. Install the housing cover on the terminal block and secure with cover lock (34, Figure 6-1), gasket (33), and screw (32).

4. For an Oxymitter 4000 with an integrally mounted SPS 4000, remove screws (26, Figure 6-11) and terminal cover (27). Check that the power and signal terminations are properly connected to terminal strip (25) and secure according to instructions in Section II, INSTALLATION.

5. Install terminal cover (27) and secure with screws (26).



26170036

Figure 3-1. Integral Electronics

c. **Verify Oxymitter 4000 Configuration.**

Located on the microprocessor board, the top board, are two switches that configure outputs for the Oxymitter 4000 (Figure 3-2). SW1 determines if the 4-20 mA signal is internally or externally powered. SW2 determines:

1. Oxymitter 4000 status, HART or LOCAL.
2. Oxygen range, 0 to 10% O₂ or 0 to 25% O₂. (0 to 40% O₂ is also configurable only through HART/AMS.)
3. The 4-20 mA signal, at fault or power up, 4 mA or 20 mA.

CAUTION

Remove power from the Oxymitter 4000 before changing defaults. If defaults are changed under power, damage to the electronics package may occur.

d. **SW1.** The two settings are internally or externally powering the 4-20 mA signal. The factory setting is for the 4-20 mA signal to be internally powered.

e. **SW2.** The factory sets this switch as follows:

1. Position 1 is HART/LOCAL. This switch controls the configuration of the Oxymitter 4000. The defaults cannot be changed via HART/AMS unless the switch is in the HART position. Placing this switch in the LOCAL position forces the O₂ range to the setting of position 2. This switch must be placed in the LOCAL position or changes in position 2 will have no effect.
2. Position 2 determines the O₂ range. This can be set to either 0 to 10% O₂ or 0 to 25% O₂. The factory setting is 0 to 10% O₂.

WARNING

Typically, the probe's sensing cell, which is in direct contact with the process gases, is heated to approximately 1357°F (736°C), and the external temperature of the probe body may exceed 842°F (450°C). If operating conditions also contain high oxygen levels and combustible gases, the Oxymitter 4000 may self-ignite.

If necessary, the O₂ range can be configured from 0 to 40% O₂. To select values within this range, set position 1 of SW2 to HART and then enter the range via HART/AMS. Do not change position 1 of SW2 to LOCAL unless you want to operate in the range specified by position 2 of SW2.

3. Position 3 determines the output at startup or at an alarm. The settings are 4 mA or 20 mA. The factory setting is 4 mA. At startup, the current at the analog output is 4 mA or 20 mA.

4. Position 4 is not used.

f. Once the cell is up to operating temperature, the O₂ percentage can be read:

1. Access TP5 and TP6 next to the membrane keypad. Attach a multimeter across TP5 and TP6. The calibration and process gases can now be monitored. Pressing the INC or DEC once will cause the output to switch from the process gas to the calibration gas. Pressing INC or DEC a second time will increase or decrease the calibration gas parameter. If the keys have been inactive for one minute, the output reverts to the process gas. When a calibration has been initiated, the value at TP5 and TP6 is the % O₂ seen by the cell. Oxygen levels, as seen on the multimeter, are:

8.0% O₂ = 8.0 VDC
0.4% O₂ = 0.4 VDC

2. HART/AMS.
3. Model 751. The loop-driven LCD display.

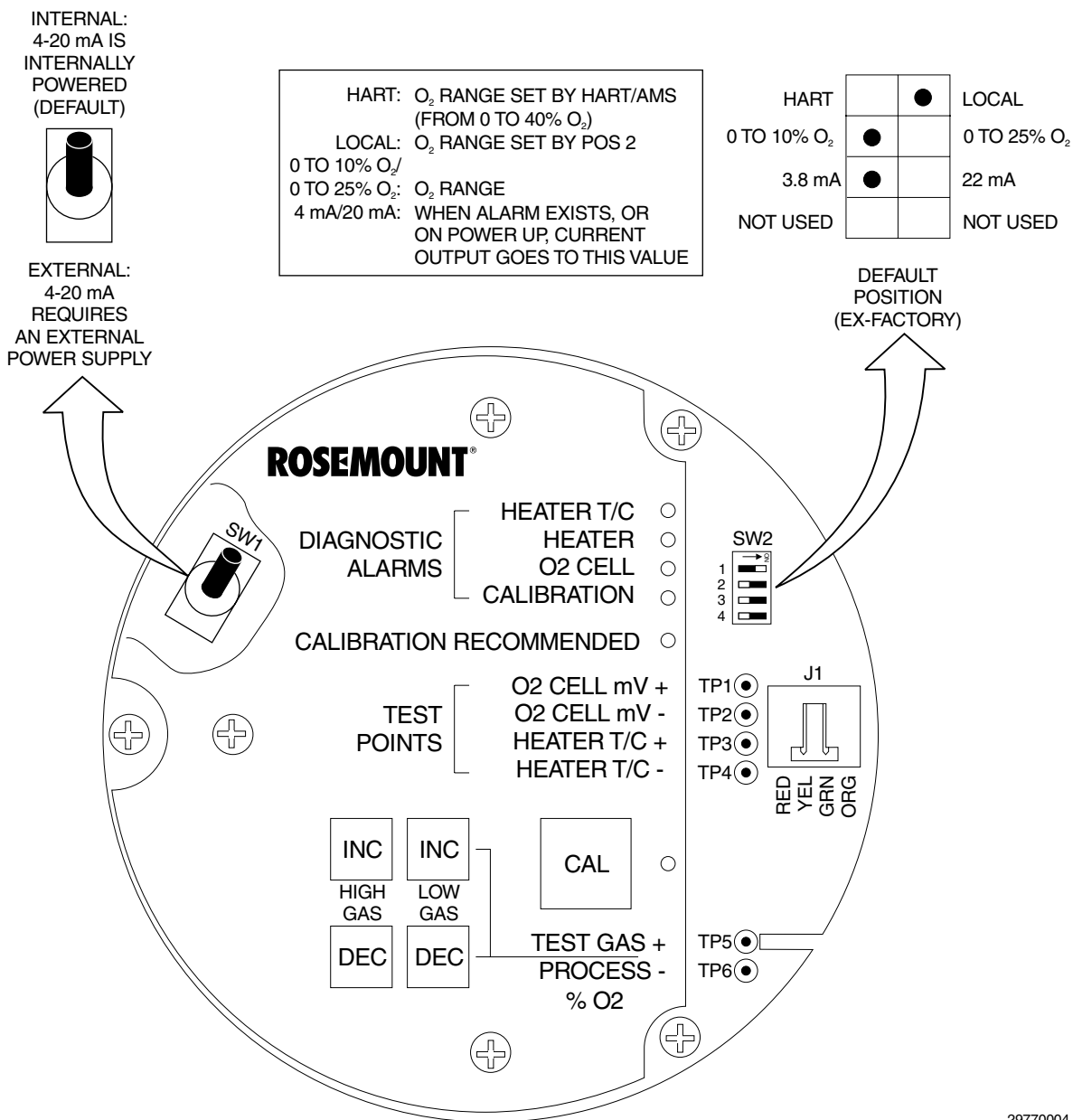


Figure 3-2. Oxymitter 4000 Defaults

3-2. LOGIC I/O. This two-terminal logic contact can be configured either as a solid-state relay-activated alarm or as a bi-directional calibration handshake signal to an IMPS 4000 or SPS 4000. The configuration of this signal depends on the setting of the LOGIC I/O PIN MODE via HART/AMS. The ten different modes available are explained in Table 3-1.

- a. Alarm.** When configured as an alarm, this signal alerts you to an out-of-spec condition. The output is 5 V in series with a 340 ohm resistor. For optimum performance, Rosemount recommends connecting the output to a Potter & Bromfield 3.2 mA DC relay (P/N R10S-E1Y1-J1.0K).

Of the ten modes in Table 3-1, modes 0 through 7 are the alarm modes. The factory default is

mode 5 for Oxymitter 4000 units without an IMPS 4000 or SPS 4000. In this mode, the output will signal when a unit alarm or a CALIBRATION RECOMMENDED indication occurs.

- b. Calibration Handshake Signal.** If using an optional IMPS 4000 or SPS 4000, the logic I/O must be configured for calibration handshaking. Of the ten modes in Table 3-1, only modes 8 and 9 are configured for calibration handshaking. For an Oxymitter 4000 with an IMPS 4000 or an SPS 4000, the factory sets the default to mode 8. In this mode, the logic I/O will be used to communicate between the Oxymitter 4000 and sequencer and to signal the sequencer when a CALIBRATION RECOMMENDATION indication occurs.

Table 3-1. Logic I/O Configuration.

Mode	Configuration
0	The unit is not configured for any alarm condition.
1	The unit is configured for a Unit Alarm.
2	The unit is configured for Low O ₂ .
3	The unit is configured for both a Unit Alarm and Low O ₂ .
4	The unit is configured for a High AC Impedance/CALIBRATION RECOMMENDED.
5*	The unit is configured for both a Unit Alarm and a High AC Impedance/CALIBRATION RECOMMENDED.
6	The unit is configured for both a Low O ₂ and High AC Impedance/CALIBRATION RECOMMENDED.
7	The unit is configured for a Unit Alarm, a Low O ₂ , and a High AC Impedance/CALIBRATION RECOMMENDED.
8**	The unit is configured for a calibration handshake with IMPS 4000 or SPS 4000. CALIBRATION RECOMMENDED will initiate the calibration cycle.
9	The unit is configured for a calibration handshake. CALIBRATION RECOMMENDED will not initiate the calibration cycle with the IMPS 4000 or SPS 4000.

*The default condition for an Oxymitter 4000 without an IMPS 4000 or SPS 4000.

**The default condition for an Oxymitter 4000 with an IMPS 4000 or SPS 4000.

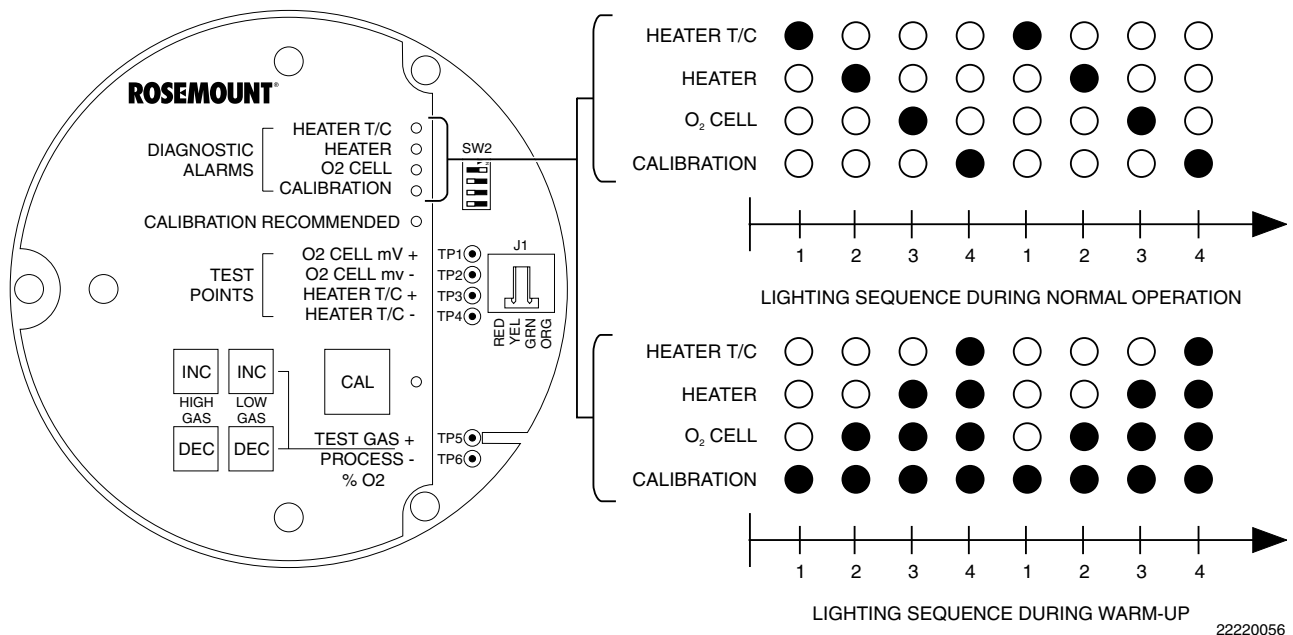


Figure 3-3. Startup and Normal Operation

3-3. RECOMMENDED CONFIGURATION.

a. 4-20 mA Signal Upon Critical Alarm.

Rosemount recommends that the factory default be utilized. The 4-20 mA signal will go to the 3.8 mA level upon any critical alarm which will cause the O₂ reading to be unusable. Customer can also select 22 mA as the failure setting if normal operations cause O₂ readings to go below the zero % O₂ (4 mA) level.

If the O₂ measurement is being utilized as part of an automatic control loop, the loop should be placed into manual upon this failure event or other appropriate action should be taken.

b. Calibration. Rosemount recommends utilizing an autocalibration system, actuated by the “calibration recommended” diagnostic. New O₂ cells may operate for more than a year, but older cells may require recalibration every few weeks as they near the end of their life. This strategy ensures that the O₂ reading is always accurate, and eliminates many unnecessary calibrations based on calendar days or weeks since previous calibration. When utilizing the SPS 4000 or the IMPS 4000, consider wiring some or all associated alarm contacts.

1. **CALIBRATION INITIATE.** Contact from the control room to an SPS 4000 or IMPS 4000 (one per probe) provides the ability to manually initiate a calibration at any time from the control room. Note that calibrations can also be initiated from a HART handheld

communicator, from Asset Management Solutions software, or from the keypad on the Oxymitter 4000.

2. **IN CALIBRATION.** One contact per probe provides notification to the control room that the “calibration recommended” diagnostic has initiated an automatic calibration through the SPS 4000 or IMPS 4000. If the O₂ signal is being utilized in an automatic control loop, this contact should be utilized to place the control loop into manual during calibration.
3. **CALIBRATION FAILED.** One contact per probe from an SPS 4000 or IMPS 4000 to the control room for notification that the calibration procedure failed. Grouped with this alarm is an output from a pressure switch which indicates when the calibration gas bottles are empty.
4. **4-20 mA SIGNAL DURING CALIBRATION.** The 4-20 mA signal can be configured to respond normally during any calibration, or can be configured to hold the last O₂ value upon the initiation of calibration. Factory default is for the 4-20 mA signal to operate normally throughout calibration. Holding the last O₂ value may be useful if several probes are being averaged for the purpose of automatic control. Unless several probes are being averaged, always place any control loops using the O₂ signal into manual prior to calibrating.

3-4. POWER UP.

- a. **Startup Display.** When power is applied to the probe, the cell heater turns on. It takes approximately one half hour for the cell to heat to operating temperature. This condition is indicated by the top four LEDs (DIAGNOSTIC ALARMS) on the membrane keypad (Figure 3-3). Starting with the CALIBRATION LED, the LEDs light in ascending order until all four LEDs are on. At this point, all four turn off and the cycle starts again. This ramp cycle continues until the cell is up to operating temperature.
- b. **Operating Display.** The ramp cycle turns into a cycle where the diagnostic LEDs light in sequence from the top to the bottom, one at a time. After the bottom LED turns on, the sequence starts again at the top with the HEATER T/C LED (Figure 3-3).
- c. **Error.** If there is an error condition at startup, one of the diagnostics LEDs will be blinking. Refer to Section V, TROUBLESHOOTING, to determine the cause of the error. Clear the error, cycle power, and the operating display should return.
- d. **Keypad.** The five membrane keys on the membrane keypad are only used during calibration to adjust the high and low gas and to initiate the calibration sequence (Figure 3-4).

3-5. **START UP OXYMITTER 4000 CALIBRATION.** Refer to Section VI, MAINTENANCE AND SERVICE, for calibration instructions.

3-6. **IMPS 4000 CONNECTIONS.** See the IMPS 4000 Intelligent Multiprobe Test Gas Sequencer Instruction Bulletin for wiring and pneumatic connections.

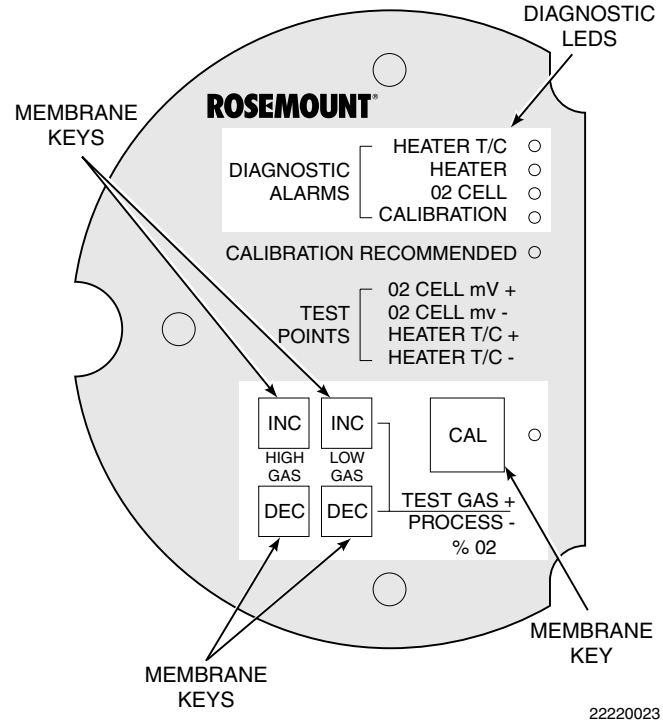


Figure 3-4. Calibration Keys

SECTION IV. OPERATION

4-1. GENERAL.

- a. **Overview.** Ensure the Oxymitter 4000 is at normal operation. The diagnostic LEDs will display the operating cycle. All other LEDs should be off (Figure 4-1).

1. **DIAGNOSTIC ALARM LEDS.** If there is an error in the system, one of these LEDs will flash various blink codes (Section V, TROUBLESHOOTING). In the case of multiple errors, only one will be displayed based on a priority system. Correct the problem and cycle power. The operating display will return or the next error will be displayed. The alarms are:

HEATER T/C
HEATER
O₂ CELL
CALIBRATION

2. **CALIBRATION RECOMMENDED LED.** Turns on when the system determines a calibration is recommended.
3. **TEST POINTS.** Test points 1 through 6 will allow you to monitor with a multimeter: the heater thermocouple, O₂ cell millivolt, and the process O₂.
 - (a) TP1 and TP2 monitor the oxygen cell millivolt output which equates to the percentage of oxygen present.
 - (b) TP3 and TP4 monitor the heater thermocouple.
 - (c) TP5 and TP6 monitor the process gas or the calibration gas parameter.

4. **CAL LED.** The CAL LED is on steady or flashing during calibration. Further information is available in Section VI, MAINTENANCE AND SERVICE.

5. **Keys.**

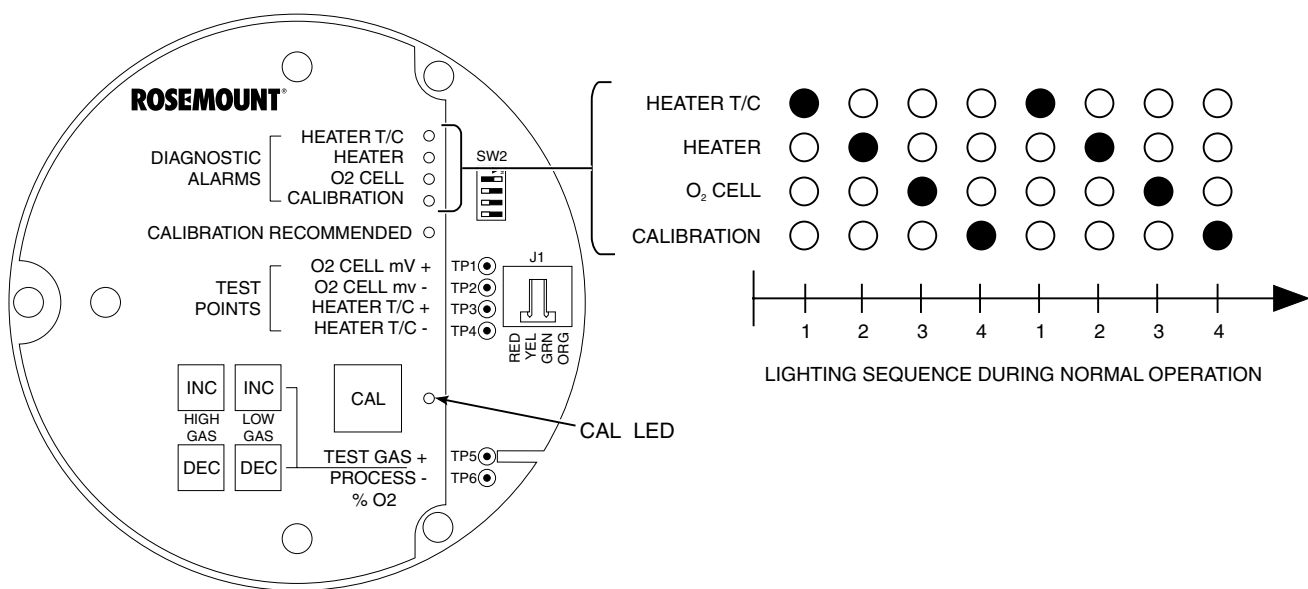
- (a) **INC and DEC.** The INC and DEC keys are used to set the values of the calibration gases. Attach a multimeter across TP5 and TP6. The calibration and process gases can now be monitored. Pressing the INC or DEC once will cause the output to switch from the process gas to the calibration gas. Pressing INC or DEC a second time will increase or decrease the calibration gas parameter. If the keys have been inactive for one minute, the output reverts to the process gas. When a calibration has been initiated, the value at TP5 and TP6 is the % O₂ seen by the cell. Oxygen levels, as seen on the multimeter, are:

8.0% O₂ = 8.0 volts DC
0.4% O₂ = 0.4 volts DC

- (b) **CAL.** The CAL key can:

- 1 Initiate a calibration.
- 2 Sequence through calibration.
- 3 Abort the calibration.

- b. **Model 751 Remote Powered Loop LCD Display (Optional).** Refer to Remote Powered Loop LCD manual for calibration and operation.



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Figure 4-1. Normal Operation

SECTION V. TROUBLESHOOTING

WARNING

Install all protective equipment covers and safety ground leads after troubleshooting. Failure to install covers and ground leads could result in serious injury or death.

5-1. GENERAL. The troubleshooting section describes how to identify and isolate faults that may develop in the Oxymitter 4000. Also, additional troubleshooting information is provided in paragraph 5-5 for those units with the optional SPS 4000. When troubleshooting the Oxymitter 4000, reference the following information.

- a. **Grounding.** It is essential that adequate grounding precautions are taken when installing the system. Thoroughly check both the probe and electronics to ensure the grounding quality has not degraded during fault finding. The system provides facilities for 100% effective grounding and the total elimination of ground loops.
- b. **Electrical Noise.** The Oxymitter 4000 has been designed to operate in the type of environment normally found in a boiler room or control room. Noise suppression circuits are employed on all field terminations and main inputs. When fault finding, evaluate the electrical noise being generated in the immediate circuitry of a faulty system. Also, ensure all cable shields are connected to earth.
- c. **Loose Integrated Circuits.** The Oxymitter 4000 uses a microprocessor and supporting integrated circuits (IC). If the electronics are handled roughly during installation or located where subjected to severe vibration, the ICs could work loose. Before troubleshooting the system, ensure all ICs are fully seated.
- d. **Electrostatic Discharge.** Electrostatic discharge can damage the ICs used in the electronics. Before removing or handling the processor board or the ICs, ensure you are at ground potential.

5-2. ALARM INDICATIONS. The majority of the fault conditions for the Oxymitter 4000 will be indicated by one of the four LEDs referred to as diagnostic, or unit, alarms on the operator's keypad. An LED will flash a code that will correspond to an error message.

Only one LED will blink at a time. An alarm code guide is provided inside the screw cover for the electronics. All alarm indications will be available via the HART Model 275 handheld communicator and Rosemount's Asset Management software. When the error is corrected and/or power is cycled, the diagnostic alarms will clear or the next error on the priority list will appear.

5-3. ALARM CONTACTS.

- a. If autocalibration is not utilized, a common bi-directional logic contact is provided for any of the diagnostic alarms listed in Table 5-1. The assignment of alarms which can actuate this contact can be modified to one of seven additional groupings listed in Table 7-1.

The logic contact is self-powered, +5 VDC, 340 ohm series resistance. An interposing relay will be required if this contact is to be utilized to annunciate a higher voltage device, such as a light or horn, and may also be required for certain DCS input cards. A Potter & Brumfield R10S-E1Y1-J1.0K 3.2 mA DC or an equal interposing relay will be mounted where the contact wires terminate in the control/relay room.

- b. If autocalibration systems are utilized, the bidirectional logic contact is utilized as a "handshake" signal between the autocalibration system (SPS 4000 or IMPS 4000) and is unavailable for alarming purposes. The following additional contacts are provided through the autocalibration systems:

1. SPS 4000 and IMPS 4000, 1-4 probes.

- (a) One contact closure per probe from the control room to the SPS 4000 or IMPS 4000 for "calibration initiate".
- (b) One contact output per probe from the SPS 4000 or IMPS 4000 to the control room for "in calibration" notification.
- (c) Once contact output per probe from the SPS 4000 or IMPS 4000 to the control room for "calibration failed" notification. (Includes output from pressure switch indicating "cal gas bottles empty").

2. Additional IMPS 4000 Alarm Contacts.

- (a) One contact per IMPS 4000 for “low calibration gas flowing”.
- (b) One contact per IMPS 4000 for “high calibration gas flowing”.

NOTE

The 4-20 mA signal can be configured to respond normally during any calibration, or can be configured to hold the last O₂ value upon the initiation of calibration. Factory default is for the 4-20 mA signal to operate normally throughout calibration. Holding the last O₂ value may be useful if

several probes are being averaged for the purpose of automatic control. Unless several probes are being averaged, always place any control loops using the O₂ signal into manual prior to calibrating.

5-4. IDENTIFYING AND CORRECTING ALARM INDICATIONS.

Faults in the Oxymitter 4000 are indicated using the four diagnostic, or unit, alarms. The pattern of repeating blinks will define the problem. A condensed table of the errors and the corresponding blink codes can be found on the inside right cover of the electronics housing. Table 5-1 also identifies the blink code and fault status of each LED as well as the output of the 4-20 mA signal line and a fault number that corresponds to the troubleshooting instructions provided in this section.

Table 5-1. Diagnostic/Unit Alarm Fault Definitions.

LED	FLASHES	STATUS	4-20 mA LINE	FAULT	SELF-CLEARING
HEATER T/C	1	OPEN	Dependent on position 3 of SW2*	1	NO
	2	SHORTED	Dependent on position 3 of SW2*	2	NO
	3	REVERSED	Dependent on position 3 of SW2*	3	NO
	4	A/D COMM ERROR	Dependent on position 3 of SW2*	4	NO
HEATER	1	OPEN	Dependent on position 3 of SW2*	5	NO
	2	HIGH HIGH TEMP	Dependent on position 3 of SW2*	6	YES
	3	HIGH CASE TEMP	Dependent on position 3 of SW2*	7	YES
	4	LOW TEMP	Dependent on position 3 of SW2*	8	NO
	5	HIGH TEMP	Dependent on position 3 of SW2*	9	YES
O ₂ CELL	1	HIGH mV	Dependent on position 3 of SW2*	10	YES
	3	BAD	Track O ₂	11	YES
	4	EEPROM CORRUPT	Dependent on position 3 of SW2*	12	NO
CALIBRATION	1	INVALID SLOPE	Track O ₂	13	YES
	2	INVALID CONSTANT	Track O ₂	14	YES
	3	LAST CALIBRATION FAILED	Track O ₂	15	YES
	**	CALIBRATION RECOMMENDED	Track O ₂		YES

* Critical alarm conditions will render the O₂ measurement as unusable, and any of these events will cause the 4-20 mA signal to go to a user-selectable limit of 3.8 mA or 22 mA (position 3 of SW2). Factory default value is 3.8 mA. Alarms which are not “self-clearing” will require recycling of power to the electronics.

** The CALIBRATION RECOMMENDED alarm flashes the Calibration Recommended alarm LED on the operator’s keypad.

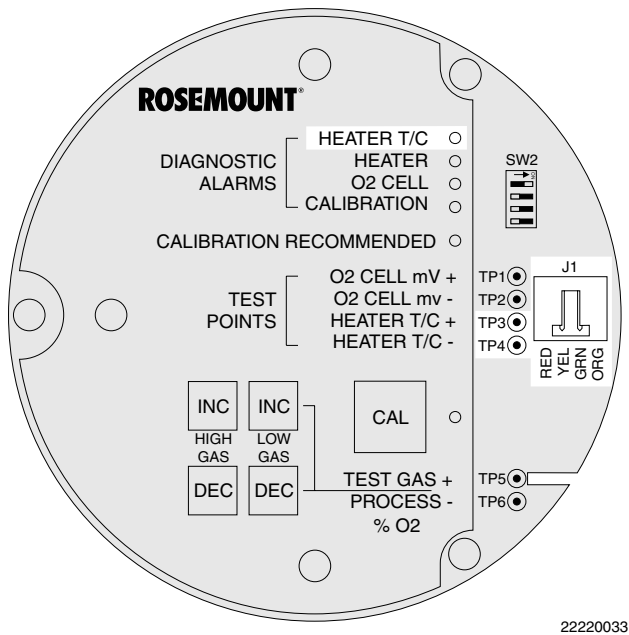
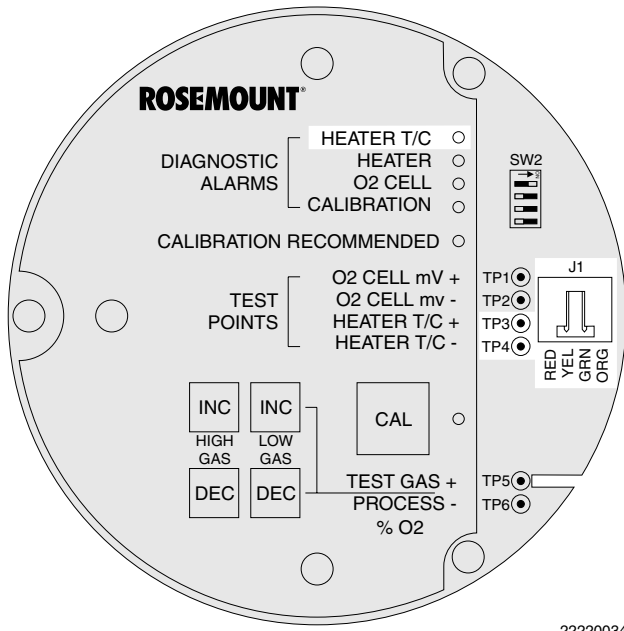


Figure 5-1. Fault 1, Open Thermocouple

a. **Fault 1, Open Thermocouple.** The HEATER T/C LED flashes once, pauses for three seconds, and repeats (Figure 5-1).

1. Check connector J1. Ensure the connector is properly seated.
2. Using a multimeter, measure TP3+ to TP4-. If the reading is 1.2 VDC $\pm$ 0.1 VDC, the thermocouple is open.
3. Remove power. Disconnect J1. Measure continuity across the red and yellow thermocouple leads.
4. The measurement should read approximately 1 ohm.
5. If the thermocouple is open, see paragraph 6-7, Heater Strut Replacement.

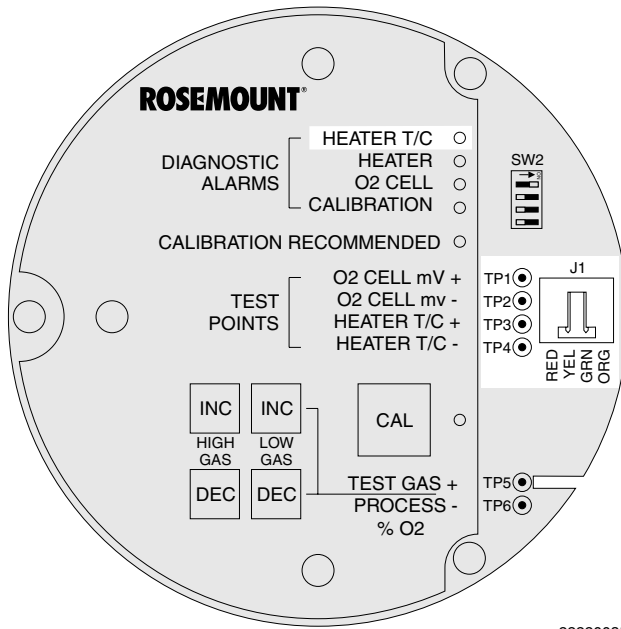


22220034

Figure 5-2. Fault 2, Shorted Thermocouple

b. Fault 2, Shorted Thermocouple. The HEATER T/C LED flashes twice, pauses for three seconds, and repeats (Figure 5-2).

1. Using a multimeter, measure across TP3+ and TP4-.
2. If the reading is 0 ± 0.5 mV, then a shorted thermocouple is likely.
3. Remove power and disconnect J1.
4. Measure from TP3+ to TP4-. The reading should be approximately 20 Kohms.
5. If so, the short is not on the PC board. See paragraph 6-7, Heater Strut Replacement.



22220035

Figure 5-3. Fault 3, Reversed Thermocouple

c. **Fault 3, Reversed Thermocouple.** The HEATER T/C LED flashes three times, pauses for three seconds, and repeats (Figure 5-3).

1. Using a multimeter, measure TP3+ to TP4-.
2. If the reading is negative, the thermocouple wiring is reversed.
3. Check red and yellow wires in the J1 connector for the proper placement.
4. If the wiring is correct, the fault is in the PC board. See paragraph 6-5b, Electronic Assembly Replacement.

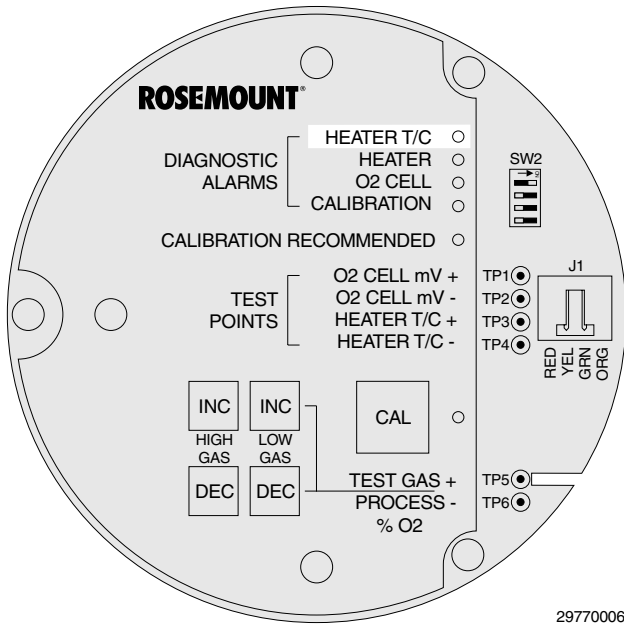


Figure 5-4. Fault 4, A/D Comm Error

d. **Fault 4, A/D Comm Error.** The HEATER T/C LED flashes four times, pauses for three seconds, and repeats (Figure 5-4).

1. Call the factory for assistance.

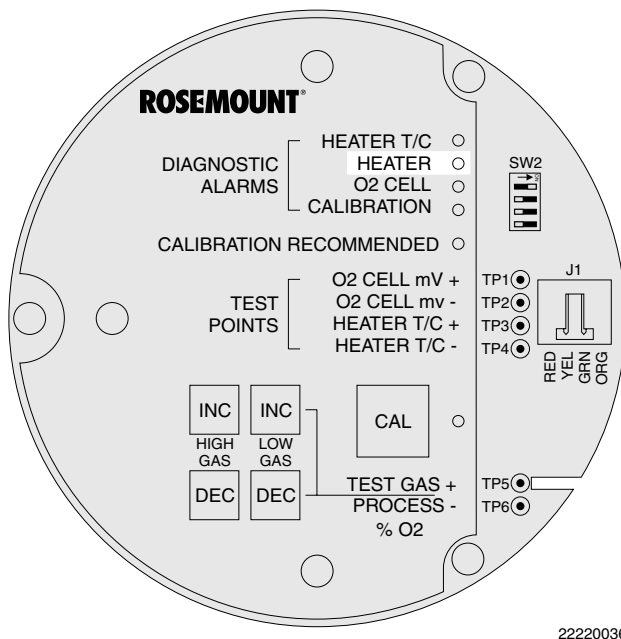
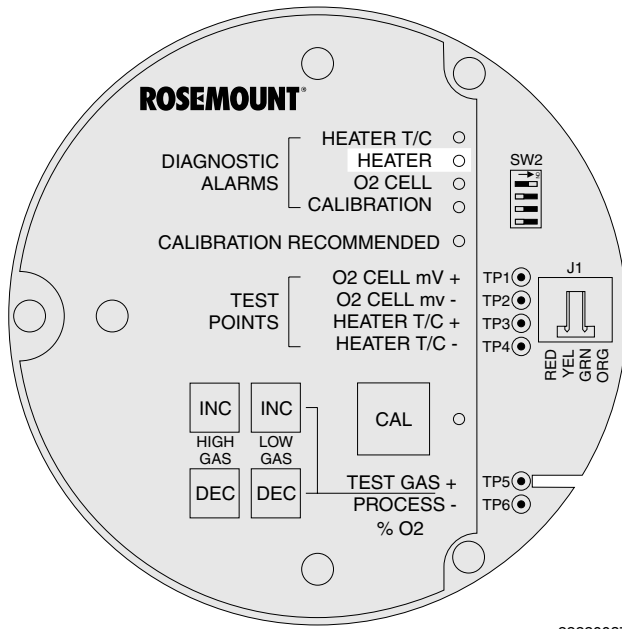


Figure 5-5. Fault 5, Open Heater

e. **Fault 5, Open Heater.** The HEATER LED flashes once, pauses for three seconds, and repeats (Figure 5-5).

1. Remove power. Remove the electronic assembly per paragraph 6-5b, Electronic Assembly Replacement.
2. Using a multimeter, measure across the heater connector J8.
3. The measurement should be approximately 72 ohms. If the heater is open, see paragraph 6-7, Heater Strut Replacement.

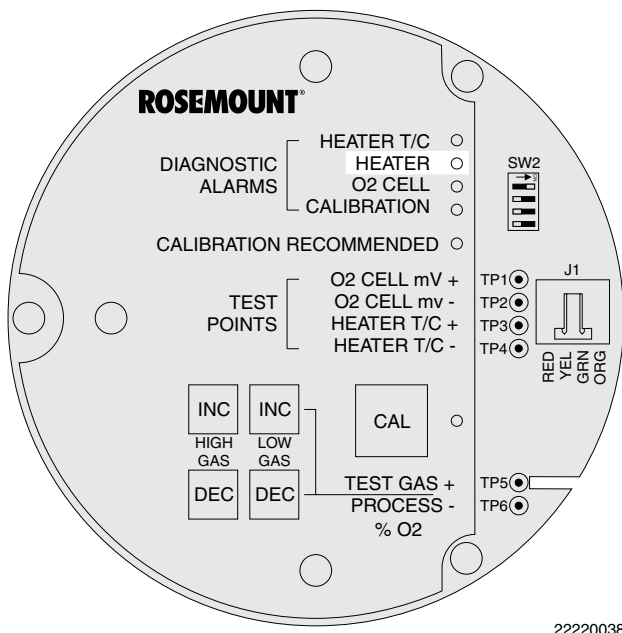


22220037

Figure 5-6. Fault 6, High High Heater Temp

f. **Fault 6, High High Heater Temp.** The HEATER LED flashes twice, pauses for three seconds, and repeats (Figure 5-6).

1. The high high heater temp alarm will activate when the thermocouple produces a voltage of 37.1 mV (1652°F/900°C).
2. The triac and the temperature control may be at fault.
3. Remove power. Allow Oxymitter 4000 to cool for five minutes. Restore power.
4. If the condition repeats, replace the electronic assembly per paragraph 6-5b, Electronic Assembly Replacement.



22220038

Figure 5-7. Fault 7, High Case Temp

g. Fault 7, High Case Temp. The HEATER LED flashes three times, pauses for three seconds, and repeats (Figure 5-7).

1. If the case temperature exceeds 185°F (85°C), the temperature control will shut off and the 4-20 mA signal output will go to the default value.
2. This signifies that the environment where the Oxymitter 4000 is installed exceeds the ambient temperature requirements or that heat due to convection is causing case temperature to rise above the limit.
3. Placing a spool piece between the stack flange and the Oxymitter 4000 flange may eliminate this problem.
4. If a spool piece does not solve the problem, relocation is the only solution.

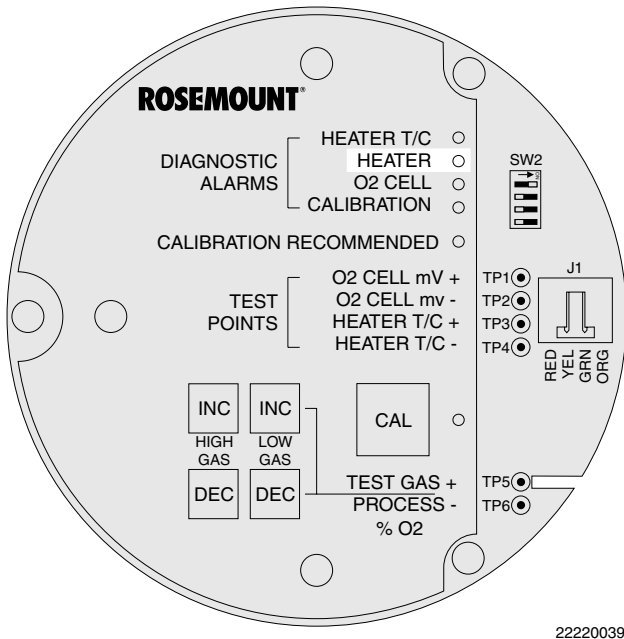


Figure 5-8. Fault 8, Low Heater Temp

h. Fault 8, Low Heater Temp. The HEATER LED flashes four times, pauses for three seconds, and repeats (Figure 5-8).

1. The low heater temperature alarm is active when the thermocouple reading has dropped below 28.6 mV.
2. If the thermocouple reading continues to ramp downward for one minute and does not return to the temperature set point of approximately 29.3 mV, then an Open Heater fault will be displayed.
3. Power down the electronics. Remove the electronic assembly per paragraph 6-5b, Electronic Assembly Replacement. Using a multimeter, measure across the heater connector, J8.
4. If the heater is good, the reading will be approximately 70 ohms. If the heater is open, see paragraph 6-7, Heater Strut Replacement.

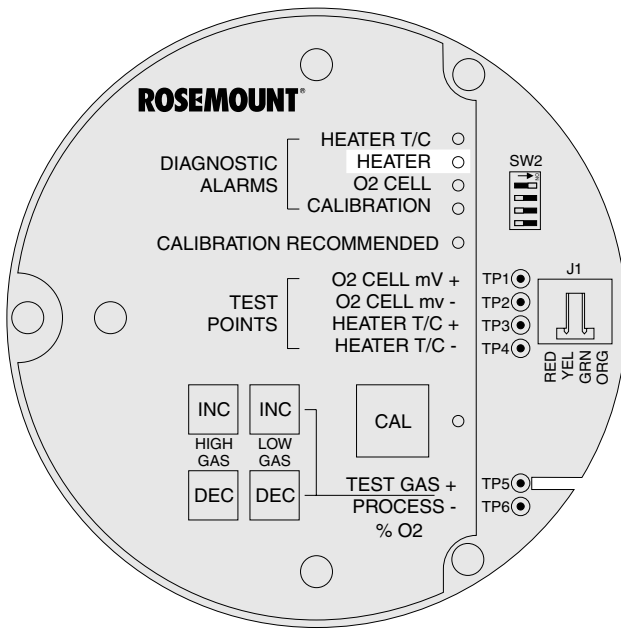


Figure 5-9. Fault 9, High Heater Temp

i. **Fault 9, High Heater Temp.** The HEATER LED flashes five times, pauses for three seconds, and repeats (Figure 5-9).

1. If the thermocouple produces a voltage in excess of approximately 30.7 mV, the high heater temp alarm activates.
2. The 4-20 mA signal returns to the default value (4 or 20 mA).
3. This alarm is self-clearing. When temperature control is restored and the thermocouple voltage returns to the normal range, the alarm clears.
4. If the temperature continues to rise, the next alarm will be the high high heater temp alarm.

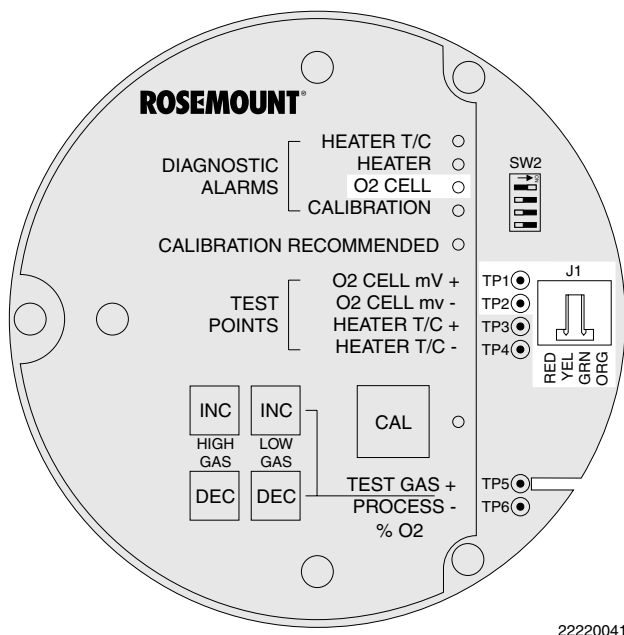
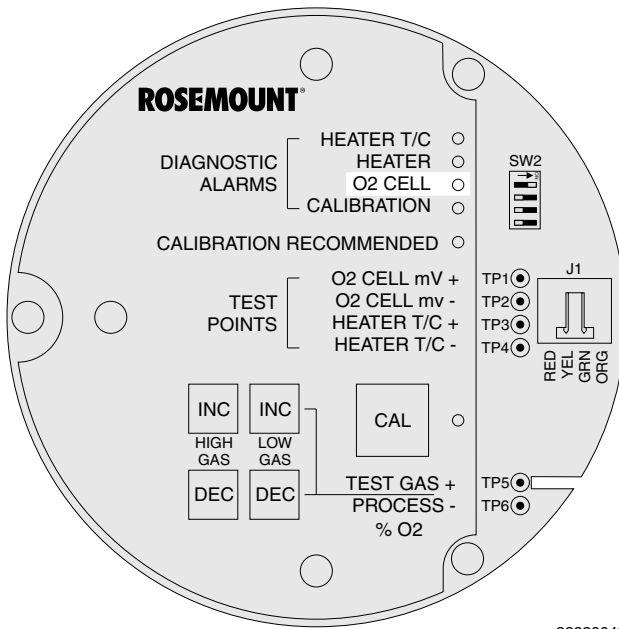


Figure 5-10. Fault 10, High Cell mV

j. **Fault 10, High Cell mV.** The O2 CELL flashes once, pauses for three seconds, and repeats (Figure 5-10).

1. Using a multimeter, measure across TP1+ to TP2-.
2. If you measure 1.2 VDC, the cell wires, either orange or green, have become detached from the input.
3. One possible cause is connector J1. The orange or green wire has come loose from the crimped connection.
4. The platinum pad could also be at fault. The pad could have broken free from the back of the cell.
5. Replace heater strut per paragraph 6-7, Heater Strut Replacement. If necessary, replace the cell flange assembly per paragraph 6-8, Cell Replacement.

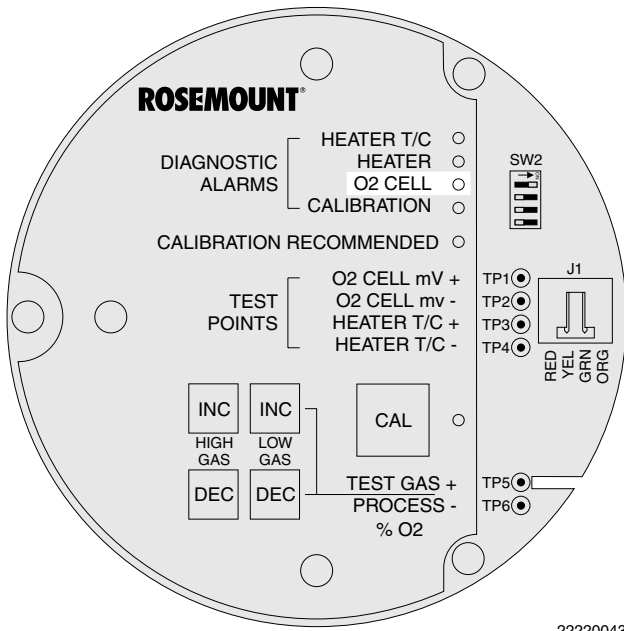


22220042

Figure 5-11. Fault 11, Bad Cell

k. **Fault 11, Bad Cell.** The O2 CELL flashes three times, pauses for three seconds, and repeats (Figure 5-11).

1. The bad cell alarm activates when the cell exceeds the maximum resistance value.
2. The cell should be replaced. See paragraph 6-8, Cell Replacement, for cell replacement instructions.



22220043

Figure 5-12. Fault 12, EEPROM Corrupt

I. Fault 12, EEPROM Corrupt. The O2 CELL LED flashes four times, pauses for three seconds, and repeats (Figure 5-12).

1. This alarm can occur if the EEPROM is changed for a later version. At power up, the EEPROM is not updated.
2. To correct this problem, power down and then restore power. The alarm should clear.
3. If the alarm occurs while the unit is running, there is a hardware problem on the micro-processor board.
4. If cycling the power does not clear the alarm, see paragraph 6-5b, Electronic Assembly Replacement.

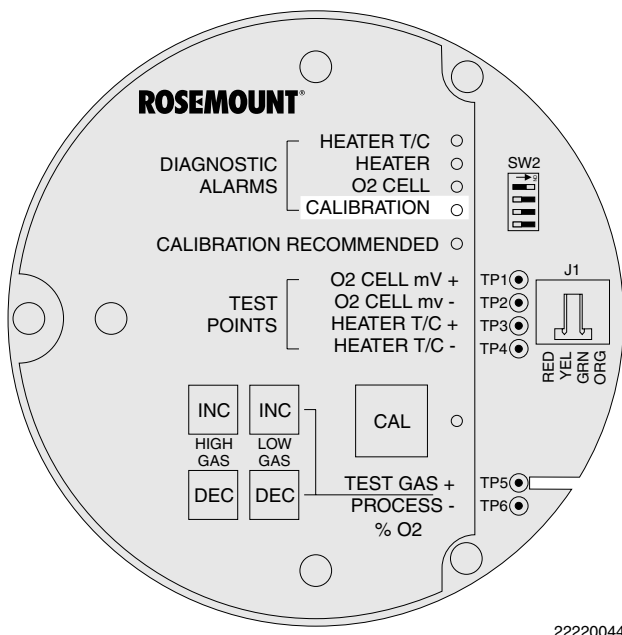


Figure 5-13. Fault 13, Invalid Slope

m. Fault 13, Invalid Slope. The CALIBRATION LED flashes once, pauses for three seconds, and repeats (Figure 5-13).

1. During a calibration, the electronics calculates a slope value. If the value of the slope is less than 35 mV/deg or more than 52 mV/deg, the slope alarm will be active until the end of the purge cycle.
2. See paragraph 6-2, Calibration. Verify the calibration by carefully repeating it. Ensure the calibration gases match the calibration gas parameters. If you attach a multimeter to TP1+ and TP2-, sample gas measurements are:

 $8\% \text{ O}_2 \approx 23 \text{ mV}$
 $0.4\% \text{ O}_2 \approx 85 \text{ mV}$
3. Power down the Oxymitter 4000 and remove it from the stack.
4. Replace the cell per paragraph 6-8, Cell Replacement.

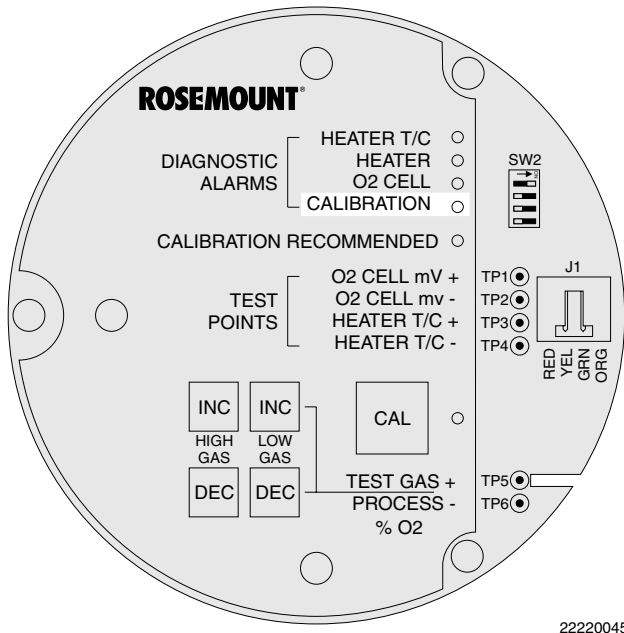


Figure 5-14. Fault 14, Invalid Constant

n. **Fault 14, Invalid Constant.** The CALIBRATION LED flashes twice, pauses for three seconds, and repeats (Figure 5-14).

1. After a calibration has been performed, the electronics calculates a cell constant value.
2. If the cell constant value is outside of the range, -4 mV to 10 mV, the alarm will activate. See paragraph 6-2, Calibration, and verify the last calibration was performed correctly.
3. Power down the Oxymeter 4000 and remove it from the stack.
4. Replace the cell per paragraph 6-8, Cell Replacement.

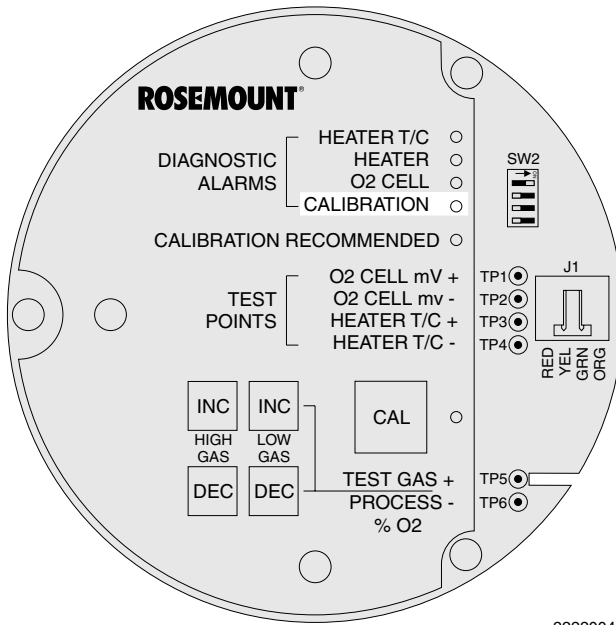


Figure 5-15. Fault 15, Last Calibration Failed

o. **Fault 15, Last Calibration Failed.** The CALIBRATION LED flashes three times, pauses for three seconds, and repeats (Figure 5-15).

1. The last calibration failed alarm activates when the slope and constant values calculated are out of range and the unit reverts to using the previous calibration values.
2. The cell should be replaced. See paragraph 6-8, Cell Replacement, for cell replacement instructions.

WARNING

Install all protective equipment covers and safety ground leads after troubleshooting. Failure to replace covers and ground leads could result in serious injury or death.

5-5. SPS 4000 TROUBLESHOOTING. Use the CAL FAIL and IN CAL relay outputs to identify possible SPS 4000 faults.

a. If a calibration was not successfully completed, the SPS 4000 sends a CAL FAIL contact indication to the control room. To determine if the SPS 4000 caused the failed calibration, go to the Oxymitter 4000 site to view the keypad. Or, access the HART/AMS menus. For more information on HART/AMS, refer to Section VII, HART/AMS.

1. If no alarms are indicated on the keypad or in the HART/AMS STATUS sub-menu, the calibration did not fail because of an Oxymitter 4000 fault. Therefore, a calibration gas flow problem occurred. Refer to Table 5-2 or Figure 5-15 to troubleshoot the SPS 4000.
2. If the LAST CAL FAILED alarm is indicated on the keypad or in the HART/AMS STATUS sub-menu, the failure is due to either a bad Oxymitter 4000 cell or a calibration gas flow problem.

- (a) Verify your calibration setup per paragraph 6-2 in Section VI, MAINTENANCE AND SERVICE. Also, verify your calibration gas setup.
- (b) Perform another calibration and monitor the process. If the calibration fails before both calibration gases finish sequencing, a gas flow problem exists. Refer to Table 5-2 or Figure 5-15 to troubleshoot the SPS 4000.

If the calibration setup is correct and the Oxymitter 4000 indicates an invalid slope fault (fault 12) before the gases are purged and a last calibration failed fault (fault 14) after the gases are purged, replace the Oxymitter 4000 cell per paragraph 6-8 in Section VI, MAINTENANCE AND SERVICE.

- b.** If a semi-automatic or manual calibration is being performed but no 5 - 30 VDC relay output contact (IN CAL or CAL FAIL) is being received by the control room, the interface board relays are malfunctioning. Replace the interface board per paragraph 6-10b.

NOTE

If the unit is performing frequent auto-calibrations, investigate at the Oxymitter 4000 site or using HART/AMS. This condition may indicate an aging cell in the Oxymitter 4000.

Table 5-2. SPS 4000 Fault Finding.

SYMPTOM	CHECK	FAULT	REMEDY
No calibration gas flow	Wiring	Improper wire connections, loose connections, or damaged wiring	Properly connect wiring or secure loose wiring connections; replace damaged wiring if necessary.
	Logic I/O	Oxymitter 4000 logic I/O not set for calibration handshaking with SPS 4000	Set logic I/O to mode 8 via HART/AMS.
	Calibration gas lines between cylinders and manifold	Clogged calibration gas line	Replace clogged calibration gas line.
	Calibration gas flowmeter knob	Flowmeter knob not turned counterclockwise to allow flow	Turn calibration gas flowmeter knob counterclockwise to allow calibration gas to flow.
	Calibration gas line between manifold and calibration gas flowmeter	Clogged calibration gas line	Replace clogged calibration gas line.
	Fuse on power supply board	Blown fuse	Replace fuse per paragraph 6-10a.
	Interface board operation	Interface board not sending signals	Replace interface board per paragraph 6-10b.
	Check valve	Clogged check valve	Replace check valve per paragraph 6-10e.
	Calibration gas line between calibration gas flowmeter and check valve	Clogged calibration gas line	Replace calibration gas line.
	Calibration gas flowmeter	Clogged flowmeter	Replace flowmeter per paragraph 6-10h.
	Power supply output	Power supply failure	Replace power supply board per paragraph 6-10b.
	Solenoid	Solenoid failure	Replace solenoid per paragraph 6-10c.
	Pressure switch	Pressure switch failure	Replace pressure switch per paragraph 6-10d.

SYMPTOM — NO TEST GAS FLOW

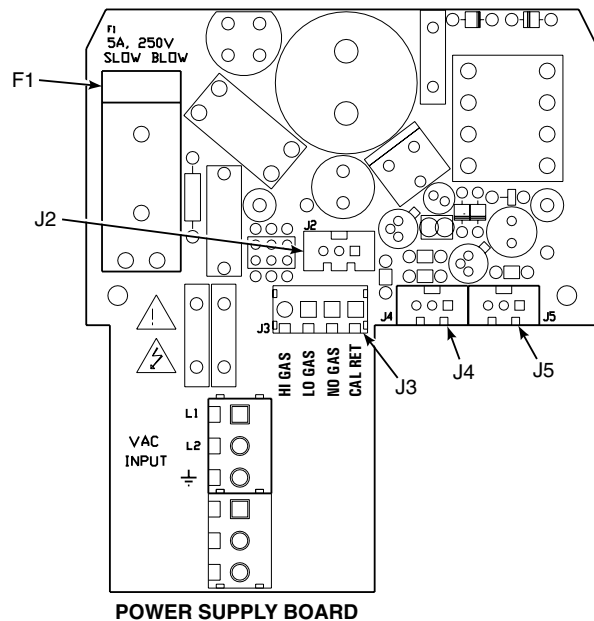
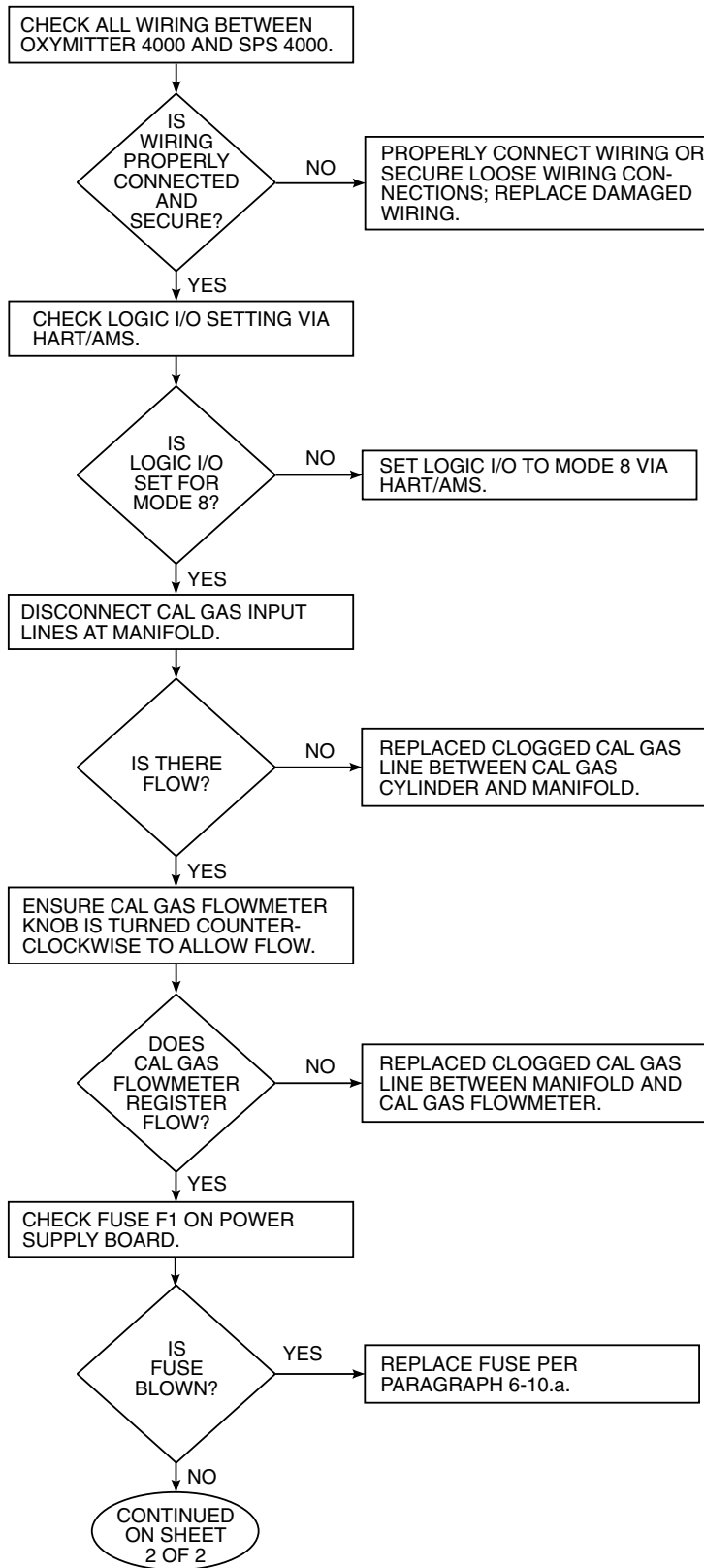
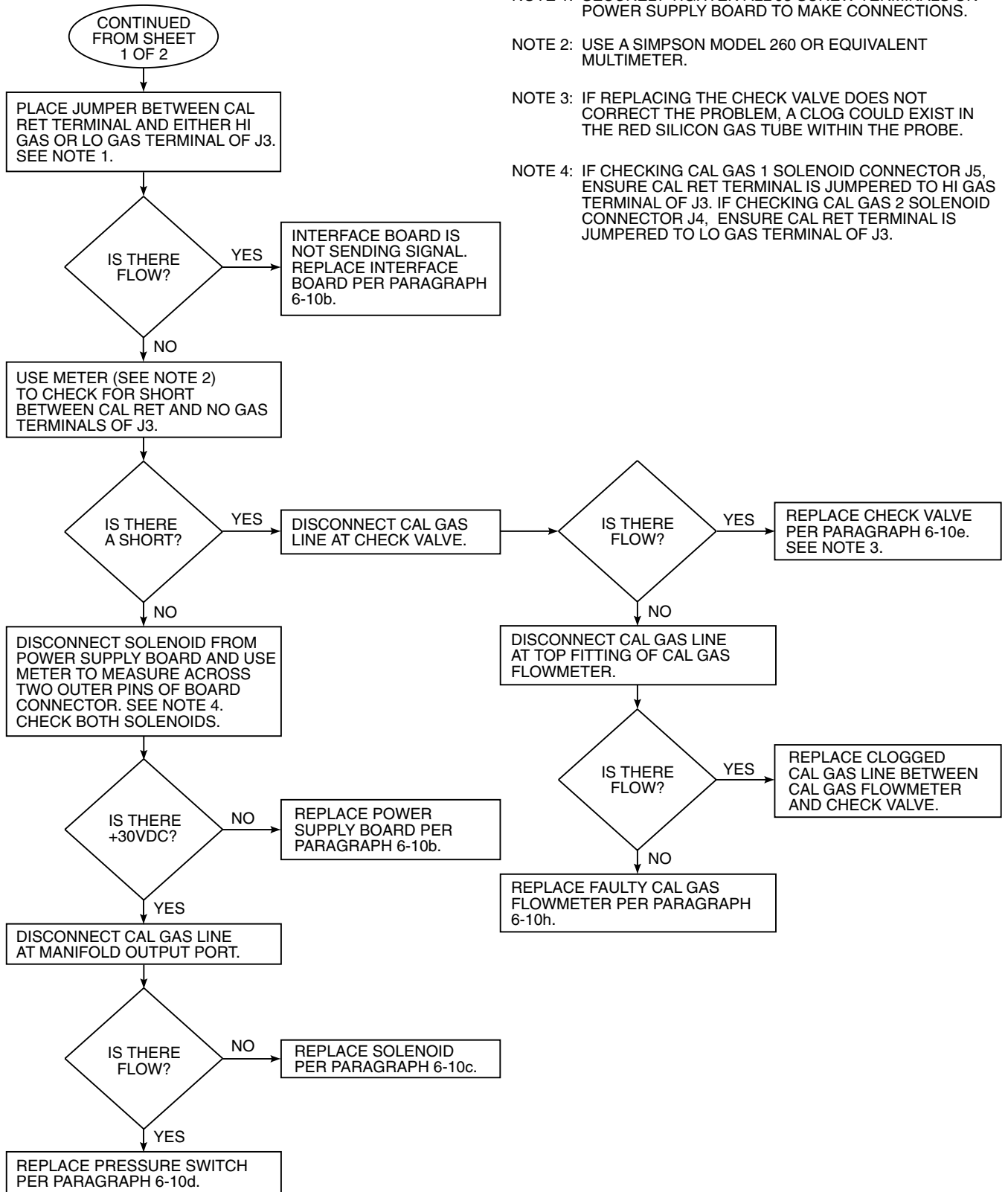


Figure 5-16. SPS 4000 Troubleshooting Flowchart (Sheet 1 of 2)

27610001

SYMPTOM — NO TEST GAS FLOW (CONTINUED)



27610002

Figure 5-16. SPS 4000 Troubleshooting Flowchart (Sheet 2 of 2)

SECTION VI. MAINTENANCE AND SERVICE

- 6-1. **OVERVIEW.** This section identifies the calibration methods available and provides the procedures to maintain and service the Oxymitter 4000 and optional integrally mounted SPS 4000.

WARNING

Install all protective equipment covers and safety ground leads after equipment repair or service. Failure to install covers and ground leads could result in serious injury or death.

- 6-2. **CALIBRATION.**

- a. During a calibration, two calibration gases with known O₂ concentrations are applied to the Oxymitter 4000. Slope and constant values calculated from the two calibration gases determine if the Oxymitter 4000 is correctly measuring the net concentration of O₂ in the industrial process.

Before calibrating the Oxymitter 4000, verify that the calibration gas parameters are correct by setting the gas concentrations used when calibrating the unit (See paragraph 4-1a5) and by setting the calibration gas flowmeter.

The calibration gas flowmeter regulates the calibration gas flow and must be set to 5 scfh. However, only adjust the flowmeter to 5 scfh after placing a new diffusion element on the end of the Oxymitter 4000. Adjusting the flowmeter at any other time can pressurize the cell and bias the calibration.

In applications with a heavy dust loading, the O₂ probe diffusion element may become plugged over time, causing a slower speed of response. The best way to detect a plugged diffusion element is to note the time it takes the Oxymitter 4000 to return to the normal process reading after the last calibration gas is removed and the calibration gas line is blocked off. A plugged element also can be indicated by a slightly lower reading on the flowmeter.

Change the diffusion element when the calibration gas flowmeter reads slightly lower during calibration or when the response time to the process flue gases becomes very slow. Each time the diffusion element is changed, reset the calibration gas flowmeter to 5 scfh and calibrate the Oxymitter 4000. To change the diffusion element, refer to paragraph 6-8.

- b. Three types of calibration methods are available: automatic, semi-automatic, and manual.

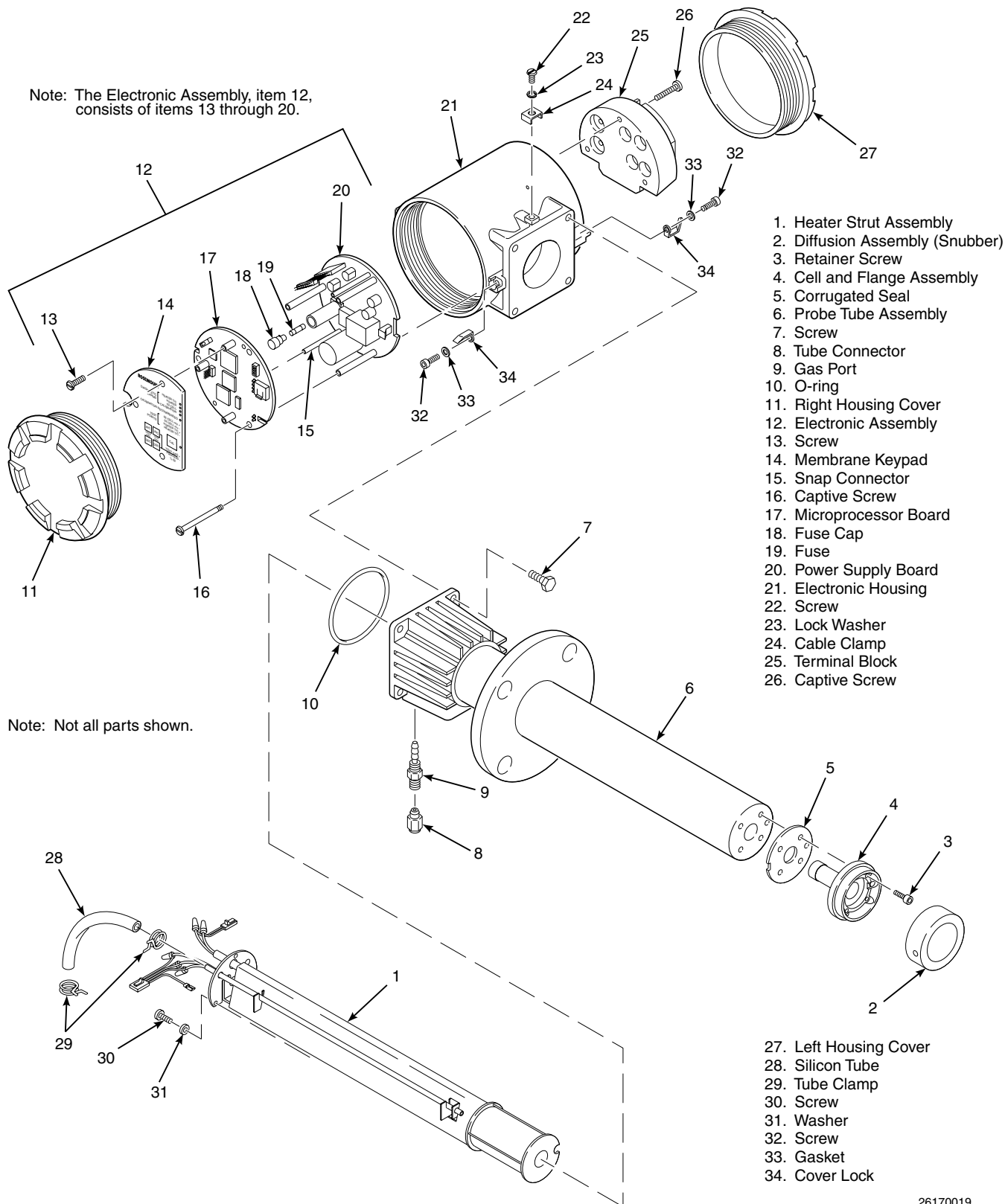
NOTE

A calibration can be aborted any time during the process by pressing the CAL key (Figure 6-2) on the Oxymitter 4000 keypad three times in a three second interval or via HART/AMS or an IMPS 4000. An aborted calibration will retain the values of the previous good calibration.

1. Automatic Calibration. Automatic calibrations require no operator action. However, the calibration gases must be permanently piped to the Oxymitter 4000, an SPS 4000 or IMPS 4000 must be installed to sequence the gases, and the Oxymitter 4000's logic I/O must be set to mode 8 via HART/AMS so the sequencer and Oxymitter 4000 can communicate.

Depending on your system setup, an automatic calibration can be initiated by the following methods:

- (a) The Oxymitter 4000's CALIBRATION RECOMMENDED alarm signals that a calibration is required.
- (b) Enter a "time since last cal" parameter (CAL INTRVL) via HART/AMS that will initiate an automatic calibration at a scheduled time interval (in hours). To configure the CAL INTRVL parameter, refer to paragraph 7-8.



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Figure 6-1. Oxymitter 4000 Exploded View

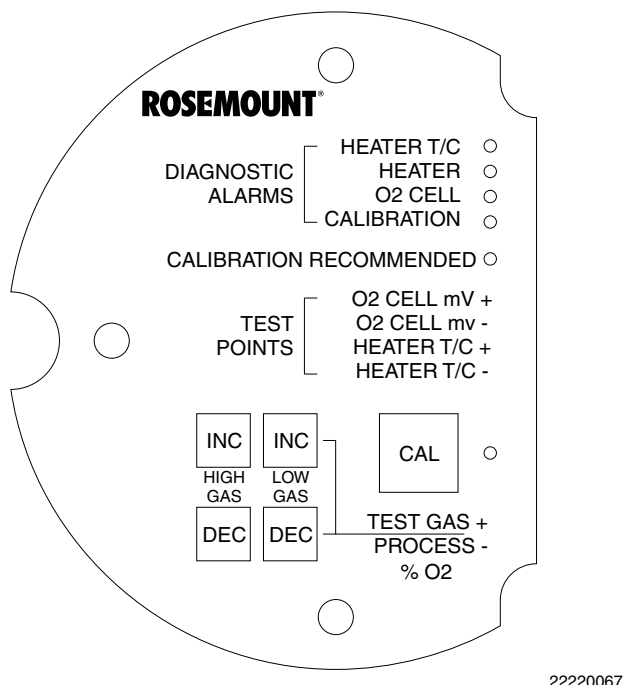


Figure 6-2. Membrane Keypad

- (c) If using an IMPS 4000, enter a time interval via the IMPS 4000 keypad that will initiate an automatic calibration at a scheduled time interval (in hours). To set the CalIntvX parameter of the CHANGE PRESETS display mode, refer to the IMPS 4000 Intelligent Multi-probe Test Gas Sequencer Instruction Bulletin for more information.

Once an automatic calibration is initiated, by any of the methods previously described, the Oxymitter 4000's CALIBRATION RECOMMENDED alarm signals an IMPS 4000 or SPS 4000 to initiate a calibration. The sequencer sends an "in cal" signal to the control room so that any automatic control loops can be placed in manual. Then, the sequencer begins to sequence the calibration gases.

2. **Semi-Automatic Calibration.** Semi-automatic calibrations only require operator initiation. However, the calibration gases must be permanently piped to the Oxymitter 4000, an SPS 4000 or IMPS 4000 must be installed to sequence the gases, and the Oxymitter 4000's logic I/O must be set to mode 8 or 9 via

HART/AMS so the sequencer and Oxymitter 4000 can communicate.

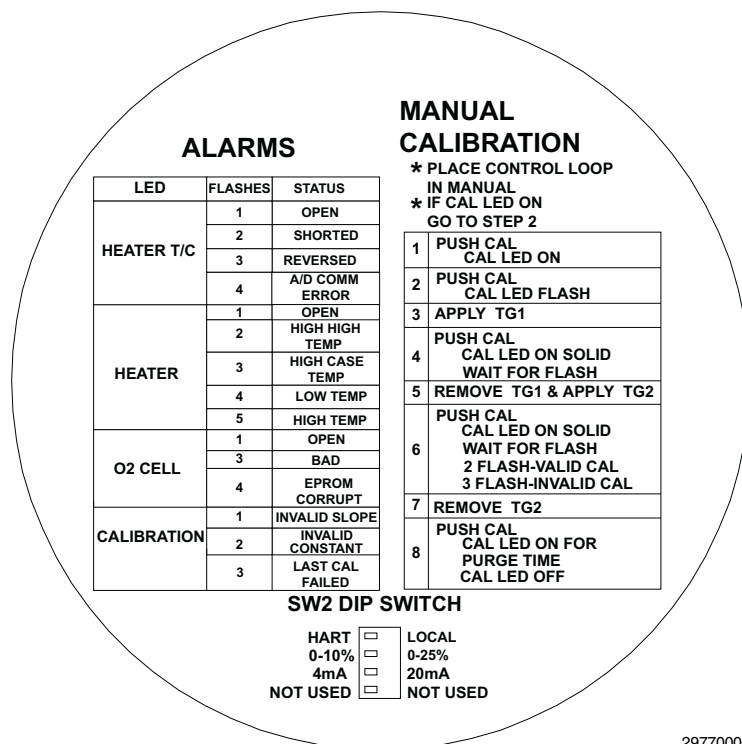
Depending on your system setup, a semi-automatic calibration can be initiated by the following methods:

- Oxymitter 4000. Press the CAL key on the Oxymitter 4000 keypad.
- IMPS 4000. Use the IMPS 4000 keypad to change the InitCalX parameter of the CHANGE PRESETS display mode from 0000 to 0001. Refer to the IMPS 4000 Intelligent Multi-probe Test Gas Sequencer Instruction Bulletin for more information.
- HART. Use the HART Communicator to access the O₂ CALIBRATE menu and perform the O₂ CAL method. Refer to paragraph 7-7 for the complete calibration procedure.
- AMS. Refer to AMS documentation for more information.
- Remote Contact. Initiate a calibration from a remote location via the remote contact input connection provided by an IMPS 4000 or SPS 4000. Refer to the documentation available for the control system in use for more information.

Once a semi-automatic calibration is initiated, by any of the methods previously described, the Oxymitter 4000's CALIBRATION RECOMMENDED alarm signals an IMPS 4000 or SPS 4000 to initiate a calibration. The sequencer sends an "in cal" signal to the control room so that any automatic control loops can be placed in manual. Then, the sequencer begins to sequence the calibration gases.

3. **Manual Calibration.** Manual calibrations must be performed at the Oxymitter 4000 site and require operator intervention throughout the process.

Manual calibration instructions can also be found, in condensed form, on the inside of the right electronics housing cover (Figure 6-3).



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Figure 6-3. Inside Right Cover

Use the following procedure to perform a manual calibration:

- (a) Place control loop in manual.
- (b) Verify the calibration gas parameters are correct per paragraph 6-2a.
- (c) If performing a manual calibration with CALIBRATION RECOMMENDED LED off and the CAL LED off, start at step 1.
- (d) If performing a manual calibration with CALIBRATION RECOMMENDED LED on and the CAL LED on, start at step 2.

1 Push the CAL key. The CALIBRATION RECOMMENDED LED will come on and the CAL LED will be on solid. If a multimeter is attached across TP5 and TP6, the reading will display the percentage of oxygen seen by the cell.

- 2 Push the CAL key. The CALIBRATION RECOMMENDED LED will turn off and the CAL LED will flash continuously. The Oxymitter 4000 can be configured so that the 4-20 mA signal will hold the last value. The default condition is for the output to track. The flashing LED indicates that the Oxymitter 4000 is ready to accept the first calibration gas.
- 3 Apply the first calibration gas. (Electronics will abort the calibration if step 4 is not done within 30 minutes).
- 4 Push the CAL key; the CAL LED will be on solid. A timer is activated to allow the calibration gas adequate time to flow (default time of five minutes). When the timer times out, the Oxymitter 4000 has taken the readings using the first calibration gas and the CAL LED will flash continuously. The flashing indicates the Oxymitter 4000 is ready to take readings using the second calibration gas.

- 5 Remove the first calibration gas and apply the second calibration gas. (Electronics will abort the calibration if step 6 is not done within 30 minutes).

- 6 Push the CAL key; the CAL LED will be on solid. The timer is activated for the second calibration gas flow. When the timer times out, the CAL LED will flash a 2 pattern flash or a 3 pattern flash (2 pattern flash equals a valid calibration, 3 pattern flash equals an invalid calibration).

If the slope or the constant is out of specification, a diagnostic alarm LED will be flashing. The diagnostic alarm will remain active until the purge cycle is over. If the three pattern flash occurs without a diagnostic alarm, the calibration gases could be the same or the calibration gas was not turned on.

The CAL LED flashing indicates the calibration is done. (See Section V, TROUBLESHOOTING, for an explanation of the 2 pattern and 3 pattern flashes).

- 7 Remove the second calibration gas and cap off the calibration gas port.
- 8 Push the CAL key; the CAL LED will be on solid as the unit purges. (Default purge time is three minutes). When the purge is complete, the CAL LED will turn off and the Oxymitter 4000 output unlocks from its held value and begins to read the process O₂.

If the calibration was valid, the DIAGNOSTIC ALARMS LEDs will indicate normal operation. If the new calibration values, slope or constant, is not within the parameters, the DIAGNOSTIC ALARMS LED will indicate an alarm. (See Section V,

TROUBLESHOOTING, for alarm codes). If the calibration was invalid, the Oxymitter 4000 will return to normal operation, as it was before a calibration was initiated, and the parameters will not be updated.

- (e) Place control loop in automatic.

6-3. LED STATUS INDICATORS.

- a. **Diagnostic/Unit Alarms.** Table 6-1 lists the types and status of alarms that will be encountered. (See Section V, TROUBLESHOOTING, for a detailed description of each fault).
- b. When the electronics determines a calibration is recommended, the CALIBRATION RECOMMENDED LED is on solid.
- c. The CAL LED turns on when a calibration is recommended and is on during the calibration process. During calibration, the CAL LED can be flashing, which would indicate operator action is requested, or on solid, which indicates calculations and measurements are in progress.

Table 6-1. Diagnostic/Unit Alarms.

LED	FLASHES	STATUS	FAULT
HEATER T/C	1	OPEN	1
	2	SHORTED	2
	3	REVERSED	3
	4	A/D COMM ERROR	4
HEATER	1	OPEN	5
	2	HIGH HIGH TEMP	6
	3	HIGH CASE TEMP	7
	4	LOW TEMP	8
	5	HIGH TEMP	9
O2 CELL	1	HIGH mV	10
	3	BAD	11
	4	EEPROM CORRUPT	12
CALIBRATION	1	INVALID SLOPE	13
	2	INVALID CONSTANT	14
	3	LAST CALIBRATION FAILED	15

WARNING

It is recommended that the Oxymitter 4000 be removed from the stack for all service activities. The unit should be allowed to cool and be taken to a clean work area. Failure to comply may cause severe burns.

WARNING

Disconnect and lock out power before working on any electrical components. There is voltage up to 115 VAC.

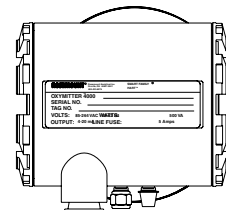
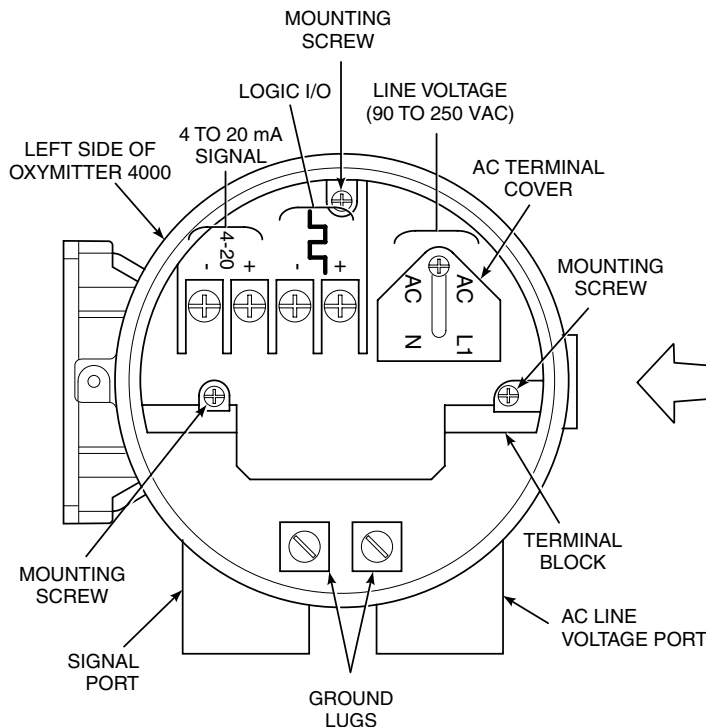
6-4. OXYMITTER 4000 REMOVAL/REPLACEMENT.

a. Oxymitter 4000 (without Integrally Mounted SPS 4000).

1. Remove.

- (a) Turn off power to the system.
- (b) Shut off the calibration gases at the cylinders and the instrument air.

- (c) Disconnect the calibration gas and instrument air lines from the Oxymitter 4000.
- (d) While facing the Oxymitter 4000 and looking at the Rosemount label, remove screw (32, Figure 6-1), gasket (33) and cover lock (34) securing left housing cover (27). Remove the cover to expose the terminal block (Figure 6-4).
- (e) Loosen the screw on the AC terminal cover and slide the cover back to access the neutral and line terminals. Loosen the AC line and neutral terminal screws and remove the leads. Loosen the ground lug screws and remove the leads. Slide the line power leads out of the AC line voltage port.
- (f) Loosen the logic I/O and the 4-20 mA signal terminal screws. Remove the leads from the terminals and slide the wires out of the signal port.
- (g) Remove insulation to access the mounting bolts. Unbolt the Oxymitter 4000 from the stack and take it to a clean work area.
- (h) Allow the unit to cool to a comfortable working temperature.



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Figure 6-4. Terminal Block

2. Replace.

- (a) Bolt the Oxymitter 4000 to the stack and install insulation.
- (b) Insert the logic I/O and 4-20 mA leads in the signal port and connect to the logic I/O and 4-20 mA screw terminals (Figure 6-4).
- (c) Insert the power leads in the AC line voltage port and connect to the AC line screw terminals. Connect the line, or L1, wire to the L1 terminal, and the neutral, or L2, wire to the N terminal. Slide the AC terminal cover over the terminal connection and tighten the cover screw.
- (d) Install left housing cover (27, Figure 6-1) and ensure it is tight. Secure the cover using cover lock (34), gasket (33), and screw (32).
- (e) Connect the calibration gas and instrument air lines to the Oxymitter 4000.
- (f) Turn on the calibration gases at the cylinders and turn on instrument air.
- (g) Restore power to the system.

b. Oxymitter 4000 (with Integrally Mounted SPS 4000).

1. Remove.

- (a) Turn off power to the system.
- (b) Shut off the calibration gases at the cylinders and the instrument air.
- (c) Disconnect the instrument air and calibration gas lines from the SPS 4000. If the instrument air does not flow through the SPS 4000, disconnect the instrument air directly at the Oxymitter 4000.

- (d) Remove the screws securing the terminal cover to the SPS 4000 manifold. Remove the terminal cover to expose the terminal strip.
- (e) Tag all customer-wired leads that are connected to the terminal strip before removing.
- (f) On the terminal strip, loosen the screws securing the customer-wired LINE IN and NEUTRAL leads to terminals L and N (Figure 2-10). Also, remove the customer-wired ground lead from the ground lug. Remove the leads from the terminal strip and slide them from the manifold through the line voltage conduit port.
- (g) Next, loosen the screws of remote contact input terminals 1 and 2; 4-20 mA terminals 3 and 4; and relay output terminals 7, 8, 9, and 10. Remove the leads from the terminal strip and slide them from the manifold through the signal conduit port.
- (h) Remove insulation to access the mounting bolts. Unbolt the Oxymitter 4000/SPS 4000 assembly from the stack and take the entire assembly to a clean work area.
- (i) Allow the unit to cool to a comfortable working temperature.

2. Replace.

- (a) Bolt the Oxymitter 4000/SPS 4000 assembly to the stack and install insulation.
- (b) Follow the instructions in paragraph 2-3 to connect the line voltage and signal leads to an Oxymitter 4000/SPS 4000 assembly.

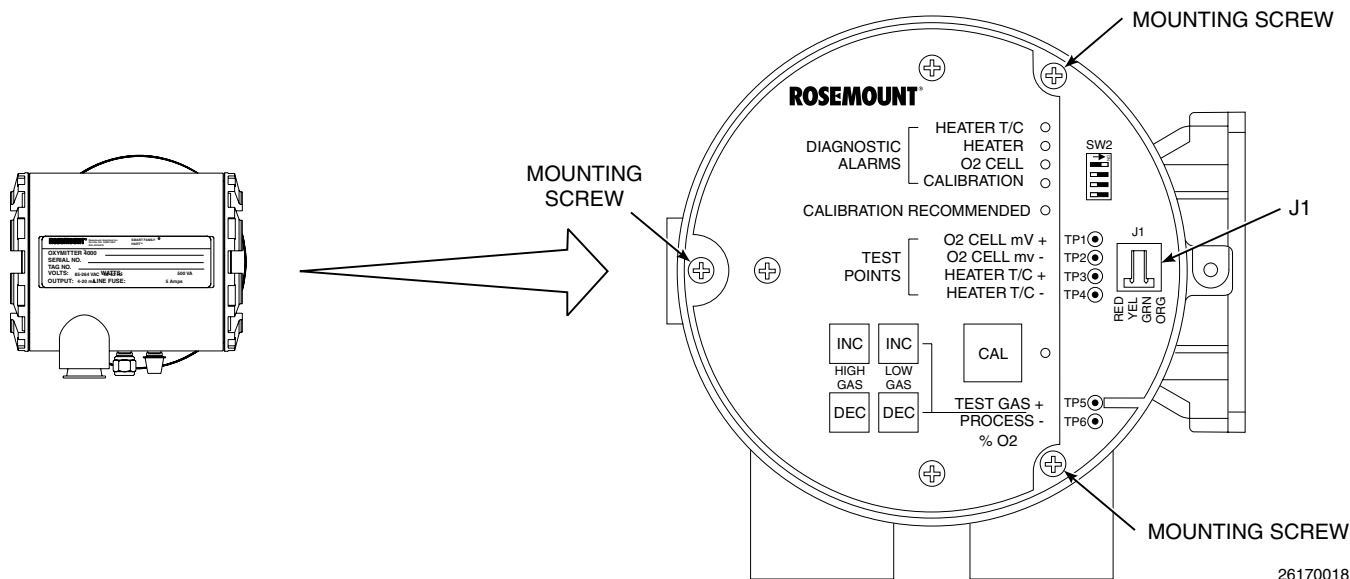


Figure 6-5. Electronic Assembly

- (c) Follow the instructions in paragraph 2-5 to connect the calibration gases and instrument air to an Oxymitter 4000/SPS 4000 assembly. Turn on the calibration gases at the cylinders and turn on instrument air.

- (d) Restore power to the system.

If removing an Oxymitter 4000/ SPS 4000 assembly, follow the instructions in paragraph 6-4b1.

2. Remove the right housing cover uncovering the electronic assembly (Figure 6-5).
3. Depress and remove the J1 (cell and T/C) connector from the J1 socket. Loosen the three captive mounting screws on the microprocessor board (top board).
4. The J8 connector (heater leads) can be accessed by moving the J1 connector leads out of the slot on the microprocessor board and sliding the electronic assembly partially out of the housing (Figure 6-6).

6-5. ELECTRONICS REPLACEMENT. Each of the following procedures details how to remove and replace a specific electronic component of the Oxymitter 4000.

NOTE

Recalibration is required whenever electronic cards or sensing cell is replaced.

a. Entire Electronics Replacement (with Housing).

NOTE

Only perform this procedure on Oxymitter 4000 units without integrally mounted SPS 4000 units. If it is necessary to replace the entire electronics on an Oxymitter 4000/ SPS 4000 assembly, contact Rosemount for further instructions.

1. Follow the instructions in paragraph 6-4a1 to remove the Oxymitter 4000 from the stack or duct.

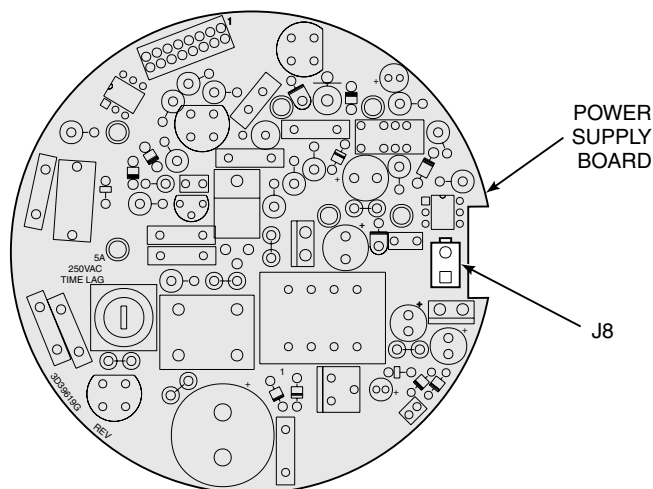


Figure 6-6. J8 Connector

5. Squeeze the J8 connector on the sides and carefully remove. The electronic assembly can now be completely removed from the housing.
6. Remove the four screws (7, Figure 6-1) from the probe finned housing. The probe and the electronic housing can now be separated.
7. When reinstalling or replacing the electronic housing, make sure that O-ring (10) is in good condition. Place the J1 and J8 connectors in the hole on the flat side of the electronic housing.
8. Hold the J1 and J8 connectors out and to the probe side of the electronic housing. Make sure that the conduit port of the electronic housing is on the same side as the CAL and REF gas ports. Replace the four screws and tighten.
9. Reconnect the J8 connector to the power supply board. Make sure the connector is secure.
10. Holding the J1 connector leads, slide the electronic assembly the rest of the way into the housing. Align the electronic assembly so that it fits flush on the pins. To ensure that it is flush, gently try to rotate the electronics. If the electronics rotates, repeat the alignment.
11. Reconnect the J1 connector to the microprocessor board. Ensure the connector is secure and tighten the three captive screws on the microprocessor board (top board).
12. Replace the housing cover and ensure it is tight.
13. Follow the instructions in paragraph 6-4a2 to install the Oxymitter 4000 into the stack or

duct. If installing an Oxymitter 4000/SPS 4000 assembly, follow the instructions in paragraph 6-4b2.

b. Electronic Assembly Replacement. (Figure 6-5).

1. Remove the right housing cover uncovering the electronic assembly.
2. Depress and remove the J1 (cell and T/C) connector from the J1 socket. Loosen the three captive mounting screws on the microprocessor board (top board).
3. The J8 connector (heater leads) can be accessed by moving the J1 connector leads out of the slot on the microprocessor board and sliding the electronic assembly partially out of the housing (Figure 6-6).
4. Squeeze the J8 connector on the sides and carefully remove. The electronic assembly can now be completely removed from the housing.
5. Reconnect the J8 connector to the power supply board. Make sure the connector is secure.
6. Holding the J1 connector leads, slide the electronic assembly the rest of the way into the housing. Align the electronic assembly so that it fits flush on the pins. To ensure that it is flush, gently try to rotate the electronics. If the electronics rotates, repeat the alignment.
7. Reconnect the J1 connector to the microprocessor board. Ensure the connector is secure and tighten the three captive screws on the microprocessor board (top board).
8. Replace the housing cover and ensure it is tight.

c. Terminal Block Replacement (Figure 6-4).

1. Loosen the mounting screws on the terminal block and carefully lift the block out of the housing.
2. Carefully align the new terminal block on the pins so that it sits flat in the housing. The round end of the terminal block should be on the opposite side of the housing conduit ports and should not be able to rotate.
3. Tighten the three mounting screws and ensure the terminal block is secure in the housing.

d. Fuse Replacement (Figure 6-5).

1. Remove the right housing cover uncovering the electronic assembly.
2. Depress and remove the J1 (cell and T/C) connector from the J1 socket. Loosen the three captive mounting screws on the microprocessor board (top board).
3. The J8 connector (heater leads) can be accessed by moving the J1 connector leads out of the slot on the microprocessor board and sliding the electronic assembly partially out of the housing (Figure 6-6).
4. Squeeze the J8 connector on the sides and carefully remove. The electronic assembly can now be completely removed from the housing.

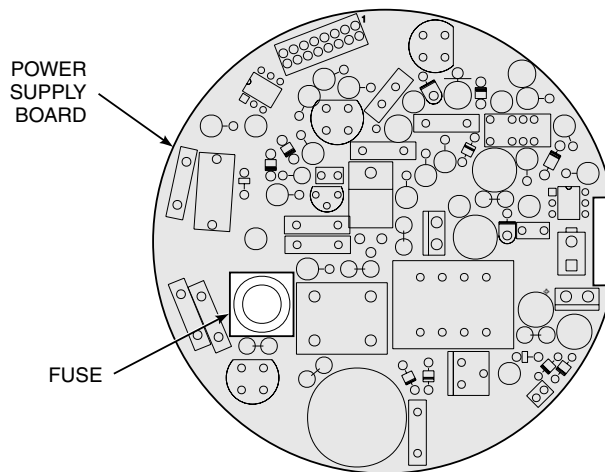


Figure 6-7. Fuse Location

5. Completely remove the three mounting screws on the microprocessor board.
6. Turn the electronic assembly over so that you are looking at the bottom of the power supply printed circuit board. Gently depress the two white posts one at a time. Carefully separate the power supply board from the microprocessor board.
7. Remove the fuse and replace it with a new one (Figure 6-7).

8. Align the white posts with the post holes on the power supply board and the pin connector on the power supply board with the connector port on the back of the microprocessor board. Gently push the boards together until the white posts snap in place. Ensure the assembly is secure by gently trying to separate the boards.
9. Reconnect connector J8 to the power supply board. Make sure the connector is secure.
10. Holding the J1 connector leads, slide the electronic assembly the rest of the way into the housing. Align the electronic assembly so that it fits flush on the pins. To ensure that it is flush, gently try to rotate the electronics. If the electronics rotates, repeat the alignment.
11. Reconnect the J1 connector to the microprocessor board. Ensure the connector is secure and tighten the three captive screws on the microprocessor board (top board).
12. Replace the housing cover and ensure that it is tight.

6-6. ENTIRE PROBE REPLACEMENT (EXCLUDING ELECTRONICS).

Do not attempt to replace the probe until all other possibilities for poor performance have been considered. If probe replacement is needed, see Table 8-1 for part numbers.

- a. Follow the instructions in paragraph 6-4a1 to remove the Oxymitter 4000 from the stack or duct. If removing an Oxymitter 4000 with an integrally mounted SPS 4000, follow the instructions in paragraph 6-4b1.
- b. Separate the probe and the electronics housing per paragraph 6-5a, steps 2 through 6.
- c. Reinstall electronics on the new probe per paragraph 6-5a, steps 7 through 13.

6-7. HEATER STRUT REPLACEMENT. This paragraph covers heater strut replacement. Do not attempt to replace the heater strut until all other possibilities for poor performance have been considered. If heater strut replacement is needed, order a replacement heater strut. (Table 8-1).

WARNING

Use heat resistant gloves and clothing when removing probe. Do not attempt to work on the probe until it has cooled to room temperature. The probe can be as hot as 800°F (427°C). This can cause severe burns.

NOTE

If the Oxymitter 4000 has an integrally mounted SPS 4000, it is not necessary to remove the sequencer when replacing the heater strut.

- a. Follow the instructions in paragraph 6-4a1 to remove the Oxymitter 4000 from the stack or duct. If removing an Oxymitter 4000/SPS 4000 assembly, follow the instructions in paragraph 6-4b1.
- b. Remove entire electronics per paragraph 6-5a, steps 2 through 6.

NOTE

If the Oxymitter 4000 is equipped with an integrally mounted SPS 4000 and installed in corrosive conditions, stainless steel gas tubes are used instead of silicon or Teflon tubes.

- c. Carefully remove the CAL and REF gas silicon tubes by pulling them off the CAL and REF gas ports. Pull the silicon tubes off the CAL and REF gas lines.

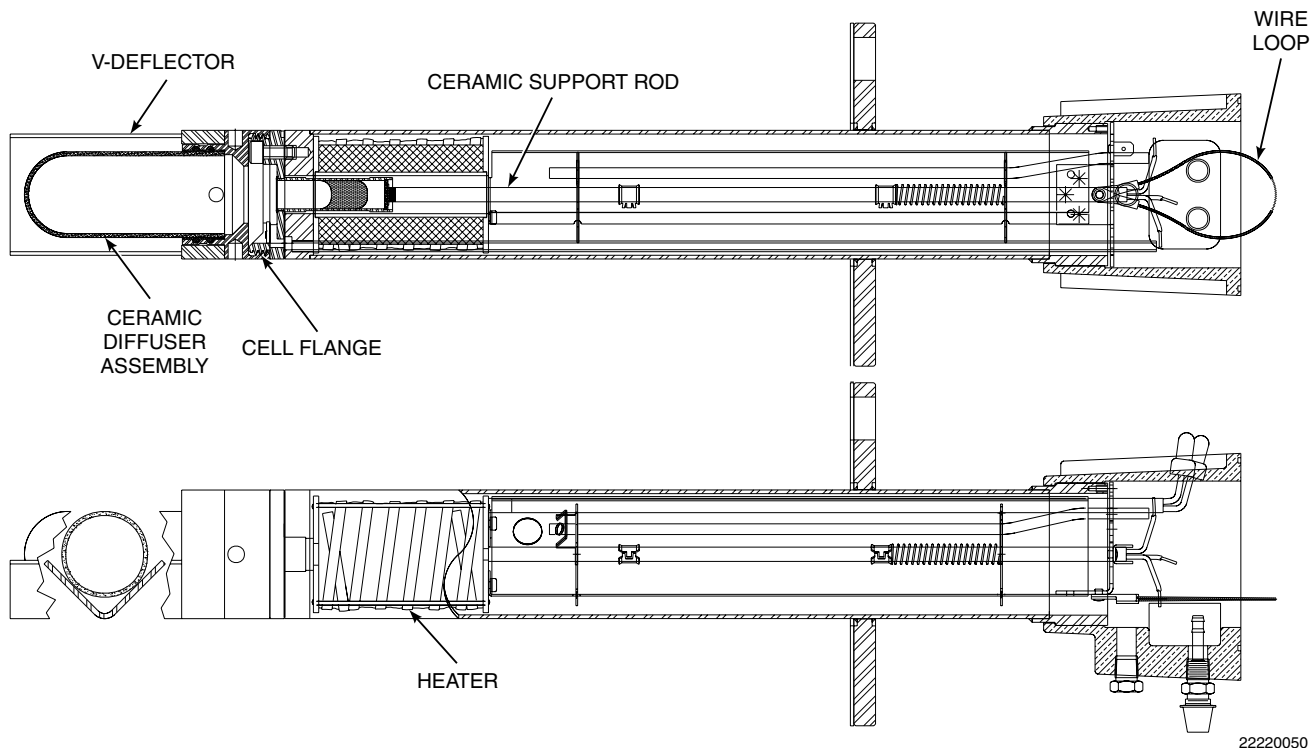


Figure 6-8. Heater Strut Assembly

- d. Loosen, but do not remove, the three screws (30, Figure 6-1) on the strut in the finned housing. The spring tension should release and the strut moves up.
- e. Grasp the wire loop and carefully slide the strut out of the probe tube (Figure 6-8).
- f. When replacing the strut, align the slot on the heater plate with the calibration gas line in the probe tube. Slide the strut into the probe tube. It will turn to align the hole on the back plate of the strut with the calibration gas line. When the hole and the calibration gas line are aligned correctly, the strut will slide in the rest of the way.
- g. Push down on the back plate of the strut to make sure you have spring tension and then tighten the three screws on the back plate.
- h. Replace the CAL and REF gas silicon tubes.
- i. Install the entire electronics per paragraph 6-5a, steps 7 through 13.
- j. Follow the instructions in paragraph 6-4a2 to install the Oxymitter 4000 into the stack or duct. If installing an Oxymitter 4000/SPS 4000 assembly, follow the instructions in paragraph 6-4b2.

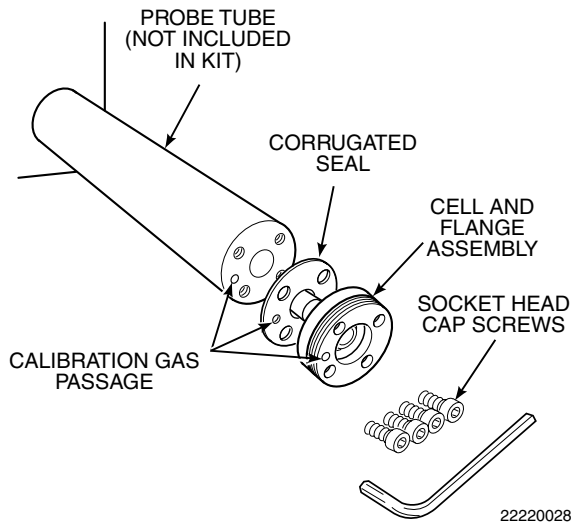


Figure 6-9. Cell Replacement Kit

- 6-8. CELL REPLACEMENT.** This paragraph covers oxygen sensing cell replacement. Do not attempt to replace the cell until all other possibilities for poor performance have been considered. If cell replacement is needed, order the cell replacement kit (Table 8-1).

The cell replacement kit (Figure 6-9) contains a cell and flange assembly, corrugated seal, setscrews, socket head cap screws, and anti-seize compound. The items are carefully packaged to preserve precise surface finishes. Do not remove items from the packaging until they are ready to be used. Spanner wrenches and hex wrenches needed for this procedure are part of an available special tools kit (Table 8-1).

WARNING

Use heat-resistant gloves and clothing when removing the probe. Do not attempt to work on these components until they have cooled to room temperature. Probe components can be as hot as 800°F (427°C). This can cause severe burns.

Disconnect and lock out power before working on any electrical components. There is voltage of up to 115 VAC.

CAUTION

Do not remove the cell unless certain it needs to be replaced. Removal may damage the cell and platinum pad. Go through the complete troubleshooting procedure to make sure the cell needs to be replaced before removing it.

- a. Follow the instructions in paragraph 6-4a1 to remove the Oxymitter 4000 from the stack or duct. If removing an Oxymitter 4000/SPS 4000 assembly, follow the instructions in paragraph 6-4b1.
- b. If the probe uses the standard diffusion element, use a spanner wrench to remove the diffusion element.

NOTE

To determine if the diffusion element needs to be replaced, refer to paragraph 6-2.

- c. If equipped with the optional ceramic diffusion assembly, remove and discard the setscrews and remove the vee deflector (Figure 6-10). Use spanner wrenches from the probe disassembly kit (Table 8-1), to turn the hub free from the retainer. Inspect the diffusion element. If damaged, replace the element.
- d. Loosen the four socket head cap screws from the cell and flange assembly and remove the assembly and the corrugated seal. The cell flange has a notch that may be used to gently pry the flange away from the probe. Note that the contact pad inside of the probe will sometimes fuse to the oxygen sensing cell. If the cell is fused to the contact pad, push the cell assembly back into the probe (against spring pressure) and quickly twist the cell assembly. The cell and contact pad should separate. **If the contact pad stays fused to the cell**, a new contact/thermocouple assembly must be installed. Disconnect the cell and the thermocouple wires at the probe electronics and withdraw the cell with the wires still attached.
- e. Remove entire electronics per paragraph 6-5a, steps 2 through 6.
- f. If the contact assembly is damaged, replace the strut or the contact pad. Instructions for replacing the contact pad are in the cell replacement kit.
- g. Remove and discard the corrugated seal. Clean the mating faces of the probe tube and retainer. Remove burrs and raised surfaces with a block of wood and crocus cloth. Clean the threads on the retainer and hub.
- h. Rub a small amount of anti-seize compound on both sides of the new corrugated seal.
- i. Assemble the cell and flange assembly, corrugated seal, and probe tube. Make sure the calibration tube lines up with the calibration gas passage in each component. Apply a small amount of anti-seize compound to the screw threads and use the screws to secure assembly. Torque to 35 in-lbs (4 N·m).
- j. Install the entire electronics per paragraph 6-5a, steps 7 through 13.
- k. Apply anti-seize compound to the threads of the cell assembly, hub, and setscrews. Reinstall the hub on the cell assembly. Using pin spanner wrenches, torque to 10 ft-lbs (14 N·m). If applicable, reinstall the vee deflector, orienting apex toward gas flow. Secure with the setscrews and anti-seize compound. Torque to 25 in-lbs (2.8 N·m).
- l. On systems equipped with an abrasive shield, install the dust seal gaskets, with joints 180° apart.
- m. Reinstall the probe and gasket on the stack flange.
- n. Follow the instructions in paragraph 6-4a2 to install the Oxymitter 4000 into the stack or duct. If installing an Oxymitter 4000/SPS 4000 assembly, follow the instructions in paragraph 6-4b2. If there is an abrasive shield in the stack, make sure the dust seal gaskets are in place as they enter the 15° reducing cone.
- o. Turn on power and monitor thermocouple output. It should stabilize at 29.3±0.2 mV. Set reference air flow at 2 scfh (56.6 l/hr). After the Oxymitter 4000 stabilizes, calibrate the unit. If new components have been installed, repeat calibration after 24 hours of operation.

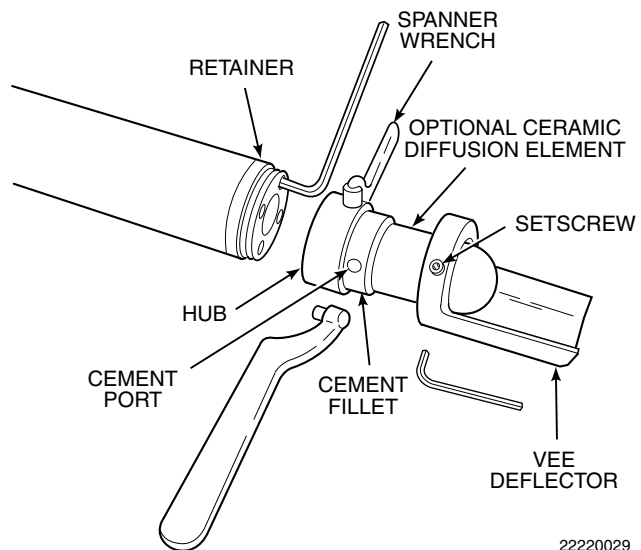


Figure 6-10. Ceramic Diffusion Element Replacement

6-9. CERAMIC DIFFUSION ELEMENT REPLACEMENT.

NOTE

This refers to the ceramic diffusion element only.

- a. **General.** The diffusion element protects the cell from particles in process gases. Normally, it does not need to be replaced because the vee deflector protects it from particulate erosion. In severe environments, the filter may be broken or subject to excessive erosion. Examine the ceramic diffusion element whenever removing the probe for any purpose. Replace if damaged.

Damage to the ceramic diffusion element may become apparent during calibration. Compare probe response with previous response. A broken diffusion element will cause a slower response to calibration gas.

Hex wrenches needed to remove setscrews and socket head screws in the following procedure are available as part of a Probe Disassembly Kit, Table 8-1.

b. Replacement Procedure.

1. Follow the instructions in paragraph 6-4a to remove the Hazardous Area Oxymitter 4000 from the stack or duct.
2. Loosen setscrews, Figure 6-10, using hex wrench from Probe Disassembly Kit, Table 8-1, and remove vee deflector. Inspect setscrews. If damaged, replace with stainless setscrews coated with anti-seize compound.
3. On systems equipped with abrasive shield, remove dual dust seal gaskets.
4. Use spanner wrenches from Probe Disassembly Kit, Table 8-1, to turn hub free from retainer.
5. Put hub in vise. Break out old ceramic diffusion element with chisel along cement line. Use a 3/8 in. (9.5 mm) pin punch and clean fillet from the cement port.
6. Break out remaining ceramic diffusion element by tapping lightly around hub with hammer. Clean grooves with pointed tool if necessary.

7. Replace ceramic diffusion element using the ceramic diffusion element replacement kit in Table 8-1. This consists of a diffusion element, cement, setscrews, anti-seize compound, and instructions.
8. Test fit replacement ceramic diffusion element to be sure seat is clean.

CAUTION

Do not get cement on ceramic diffusion element except where it touches the hub. Any cement on ceramic diffusion element blocks airflow through element. Wiping wet cement off of ceramic only forces cement into pores. Also, do not get any cement onto the flame arrester element.

9. Thoroughly mix cement and insert tip of squeeze bottle into cement port. Tilt bottle and squeeze while simultaneously turning ceramic diffusion element into seat. Do not get any cement on upper part of ceramic diffusion element. Ensure complete penetration of cement around 3 grooves in hub. Cement should extrude from opposite hole. Wipe excess material back into holes and wipe top fillet of cement to form a uniform fillet. (A cotton swab is useful for this.) Clean any excess cement from hub with water.
10. Allow filter to dry at room temperature overnight or 1 to 2 hours at 200°F (93°C).
11. Wipe a heavy layer of anti-seize compound onto the threads and mating surfaces of the flame arrester, diffusion hub, and probe tube.
12. Assemble flame arrester and diffusion hub with two pin spanner wrenches. Torque to 10 ft-lbs (14 N·m). Secure with hub retaining setscrew.
13. On systems equipped with abrasive shield, install dust seal gaskets with joints 180° apart.
14. Reinstall vee deflector, orienting apex toward gas flow. Apply anti-seize compound to setscrews and tighten with hex wrench.
15. Reinstall probe on stack flange.

6-10. SPS 4000 MAINTENANCE AND COMPONENT REPLACEMENT. These paragraphs describe SPS 4000 maintenance and component replacement procedures. Replacement parts referenced are available from Rosemount. Refer to Section VIII, REPLACEMENT PARTS, for part numbers and ordering information.

WARNING

Install all protective equipment covers and safety ground leads after equipment repair or service. Failure to install covers and ground leads could result in serious injury or death.

- a. **Fuse Replacement.** The SPS 4000 has a fuse (17, Figure 6-11) on the power supply board (18). Refer to Table 8-3 for replacement fuse specifications. Perform the following procedure to check or replace the fuse.

WARNING

Disconnect and lock out power before working on any electrical components.

1. Turn off power to the system.
2. Remove screw (7, Figure 6-11) securing manifold cover lock (6) and remove the lock.
3. Remove manifold cover (14).
4. Remove fuseholder (16) by pushing in the top and turning 1/4 turn counterclockwise. Remove fuse (17).
5. After checking or replacing fuse (17), install fuseholder (16) by pushing in the top and turning 1/4 turn clockwise.
6. Install manifold cover (14), and secure with manifold cover lock (6) and screw (7).

- b. **Board Replacement.** Perform the following procedure to replace power supply board (18, Figure 6-11) or interface board (19).

WARNING

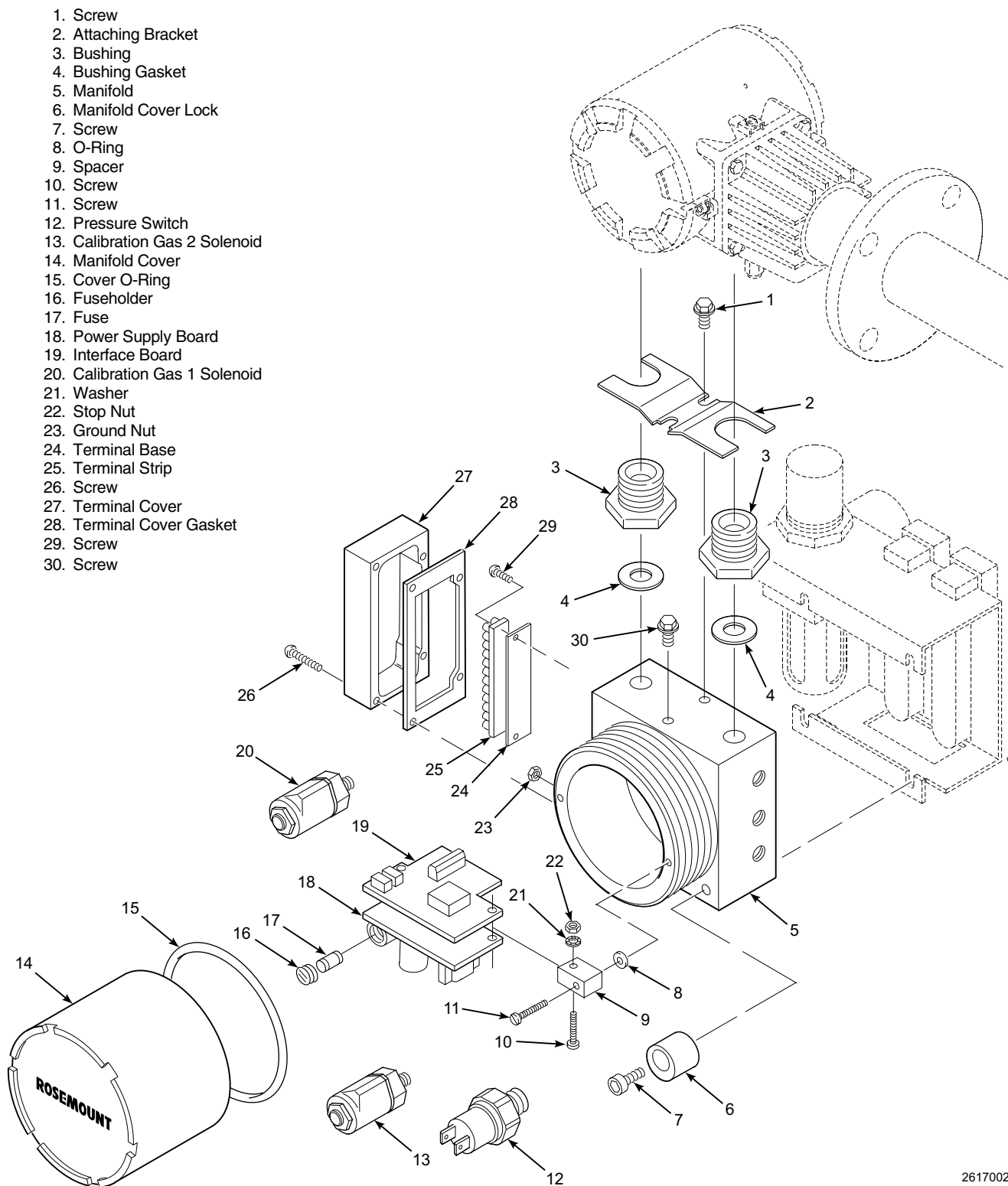
Disconnect and lock out power before working on any electrical components.

1. Turn off power to the system.

2. Remove screw (7) securing manifold cover lock (6) and remove the lock.
3. Remove manifold cover (14).
4. Remove two screws (11) attaching spacers (9) to manifold (5).
5. Being careful not to disconnect the board wiring, carefully lift power supply board (18) and interface board (19) from manifold (5) and set aside. Do not lose O-rings (8) from the bottom of spacers (9).
6. Tag all leads on the board to be replaced to simplify installation.
7. See Figure 6-12. If removing the power supply board, remove the line voltage input leads from connector J7. Also, unplug calibration gas 1 solenoid leads from connector J5, calibration gas 2 solenoid leads from connector J4, and pressure switch leads from connector J2.

See Figure 6-12. If removing the interface board, remove the CAL INITIATE leads from connector J3, CAL FAIL and IN CAL leads from connector J4, and logic I/O handshake connection from connector J5.

8. Remove stop nuts (22, Figure 6-11), washers (21), and screws (10) securing power supply board (18) and interface board (19) to spacers (9).
9. Carefully separate boards (18 and 19).
10. Connect replacement board to board (18 or 19).
11. Install screws (10), washers (21), and stop nuts (22) to secure power supply board (18) and interface board (19) to spacers (9).
12. Install all applicable leads in the appropriate locations on the power supply board or interface board as shown in Figure 6-12.
13. Install power supply board (18, Figure 6-11) and interface board (19) into manifold (5). Align spacers (9) with the mounting holes on the manifold and secure with screws (11). Ensure O-rings (8) are installed between the spacers and the manifold surface.
14. Install manifold cover (14) and secure with manifold cover lock (6) and screw (7).



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Figure 6-11. SPS 4000 Manifold Assembly

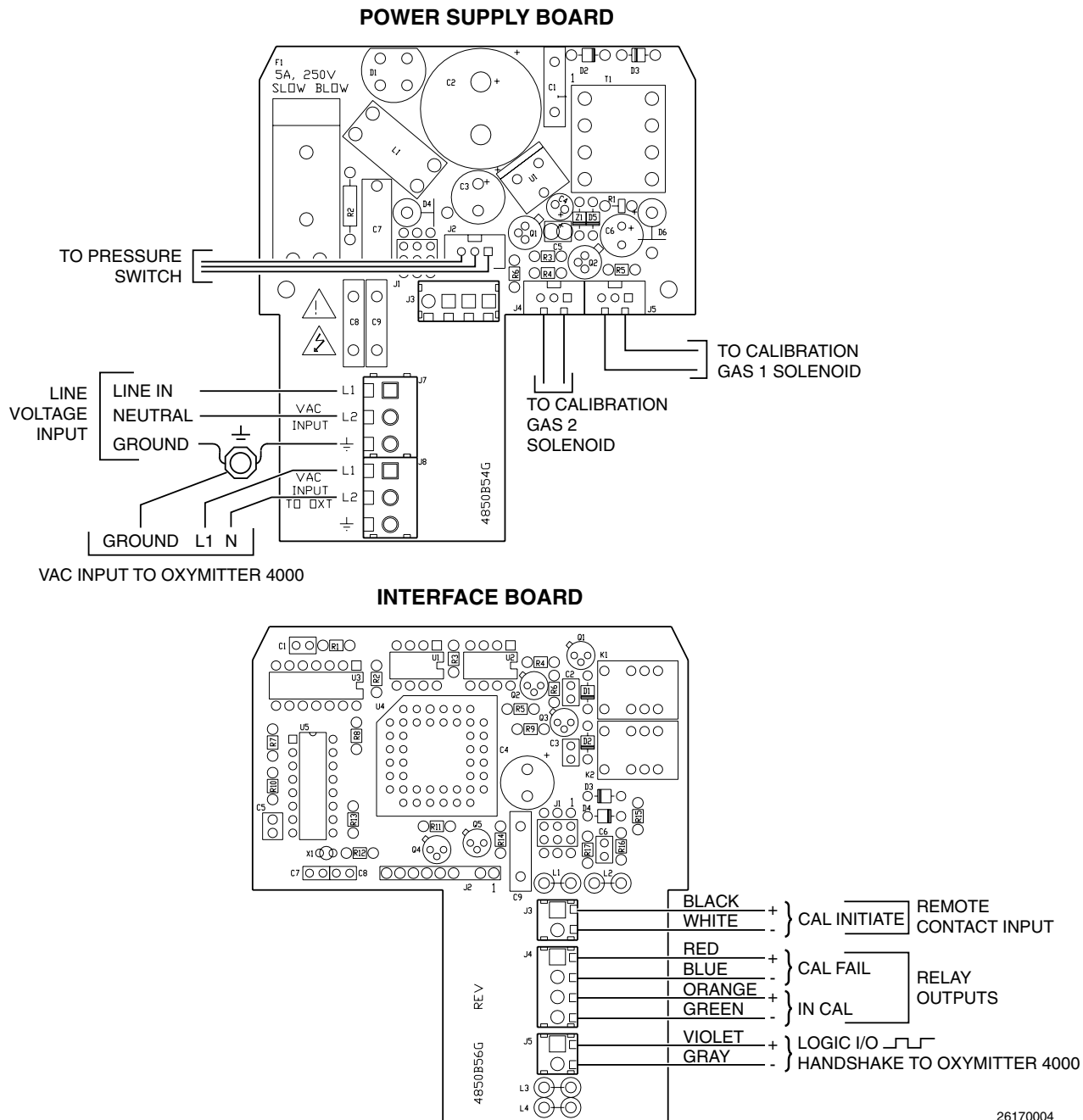


Figure 6-12. Power Supply Board and Interface Board Connections

- c. **Solenoid Replacement.** The SPS 4000 manifold has a calibration gas 1 (high calibration gas) solenoid (20, Figure 6-11) and a calibration gas 2 (low calibration gas) solenoid (13).

WARNING

Disconnect and lock out power before working on any electrical components.

1. Turn off power to the system.
2. Shut off the calibration gases at the cylinders.
3. Remove screw (7) securing manifold cover lock (6) and remove the lock.
4. Remove manifold cover (14).
5. Remove two screws (11) attaching spacers (9) to manifold (5).

6. Being careful not to disconnect the board wiring, carefully lift the board and spacer assembly from manifold (5) and set aside. Do not lose O-rings (8) from the bottom of spacers (9).
7. Tag and unplug solenoid (13 or 20) leads from power supply board (18). Refer to Figure 6-12. Calibration gas 1 solenoid wires connect to connector J5, and calibration gas 2 solenoid wires connect to connector J4.
8. Remove the top nut of solenoid (13 or 20, Figure 6-11) securing the coil assembly and washer to the base. Remove the coil assembly, including the leads, and washer. Place a 13/16 in. deep socket over the solenoid base and remove.

CAUTION

When installing a solenoid, do not overtighten. Damage to the solenoid may occur.

9. Install the new solenoid base. Be careful not to overtighten. Install the new washer and coil assembly and secure with the top nut. Connect the leads to the proper connector on power supply board (18). Refer to Figure 6-12 if necessary.
 10. Carefully install the board and spacer assembly into manifold (5, Figure 6-11) by aligning spacers (9) with the mounting holes on the manifold and securing with screws (11). Ensure O-rings (8) are installed between the spacers and the manifold surface.
 11. Install manifold cover (14), and secure with manifold cover lock (6) and screw (7).
 12. Turn on the calibration gases at the cylinders.
- d. **Pressure Switch Replacement.** Use the following procedure to replace pressure switch (12, Figure 6-11).
1. Turn off power to the system.
 2. Shut off the calibration gases at the cylinders.
 3. Remove screw (7) securing manifold cover lock (6) and remove the lock.
 4. Remove manifold cover (14).
 5. Remove two screws (11) attaching spacers (9) to manifold (5).

6. Being careful not to disconnect the board wiring, carefully lift the board and spacer assembly from manifold (5) and set aside. Do not lose O-rings (8) from the bottom of spacers (9).
7. Tag and remove the leads from pressure switch (12).
8. Place a 1-1/16 in. 6-point socket over pressure switch (12) and remove.

CAUTION

When installing the pressure switch, do not overtighten. Damage to the solenoid may occur.

9. Install new pressure switch (12). Be careful not to overtighten. Connect the leads to the proper terminals on the pressure switch.
 10. Carefully install the board and spacer assembly into manifold (5) by aligning spacers (9) with the mounting holes on the manifold and securing with screws (11). Ensure o-rings (8) are installed between the spacers and the manifold surface.
 11. Install manifold cover (14), and secure with manifold cover lock (6) and screw (7).
 12. Turn on the calibration gases at the cylinders.
- e. **Check Valve Replacement.** Check valve (19, Figure 6-13) may stick or become plugged over time. Replace when necessary. If condensation deposits are noted upon removal, consider insulating the check valve.
- f. **Pressure Regulator (Optional) Maintenance.**
1. Pressure Adjustments. Reference air pressure regulator (8, Figure 6-13) is factory set to 20 psi (138 kPa). Adjust using the knob on top of the pressure regulator if necessary.

WARNING

Do not use fingers to release valve stem. The valve may release air at high pressures and cause injury.

2. Condensation Drain. To drain excess moisture from the filter bowl of reference air pressure regulator (8), use a screwdriver or comparable tool to periodically release valve stem on the bottom of the regulator.

g. Flowmeter Adjustments.

1. Calibration Gas Flowmeter. Calibration gas flowmeter (17, Figure 6-13) regulates the calibration gas flow and must be set to 5 scfh. However, only adjust the flowmeter to 5 scfh after placing a new diffusion element on the end of the Oxymitter 4000. Adjusting the flowmeter at any other time can pressurize the cell and bias the calibration.

In applications with a heavy dust loading, the O₂ probe diffusion element may become plugged over time, causing a slower speed of response. The best way to detect a plugged diffusion element is to note the time it takes the Oxymitter 4000 to return to the normal process reading after the last calibration gas is removed and the calibration gas line is blocked off. A plugged element also can be indicated by a slightly lower reading on the flowmeter.

Change the diffusion element when the calibration gas flowmeter reads slightly lower during calibration or when the response time to the process flue gases becomes very slow. Each time the diffusion element is changed, reset the calibration gas flowmeter to 5 scfh and calibrate the Oxymitter 4000. For more information on changing the diffusion element, refer to paragraph 6-8.

2. Reference Air Flowmeter (Optional). Reference air flowmeter (16, Figure 6-13) regulates the reference air and must be set to 2 scfh. Adjust the flow with the knob on the bottom of the reference air flowmeter when necessary.

h. Flowmeter Replacement. Use this procedure to replace either reference air flowmeter (16, Figure 6-13) or calibration gas flowmeter (17).

1. Turn off power to the system.
2. Shut off the calibration gases at the cylinders.
3. Loosen, but do not remove, four screws (13) securing flowmeter bracket (25) to the manifold.
4. Flex the bottom of flowmeter bracket (25) downward and away to disengage and remove from the manifold.

5. For reference air flowmeter (16), remove pressure regulator (8) by disconnecting tubing (11) from elbow fitting (10). Also, disconnect tubing (24) from straight fitting (23).

For calibration gas flowmeter (17), disconnect tubing (18) at elbow fitting (21). Also, disconnect gas tubing (2) from elbow fitting (15).

6. Remove screws (6) and bracket (5) securing flowmeter (16 or 17) to flowmeter bracket (25).
7. Remove flowmeter (16 or 17), with installed fittings, from flowmeter bracket (25).
8. For reference air flowmeter (16), remove elbow street fittings (14 and 22). It is not necessary to remove fittings (10 and 23) from the street fittings.

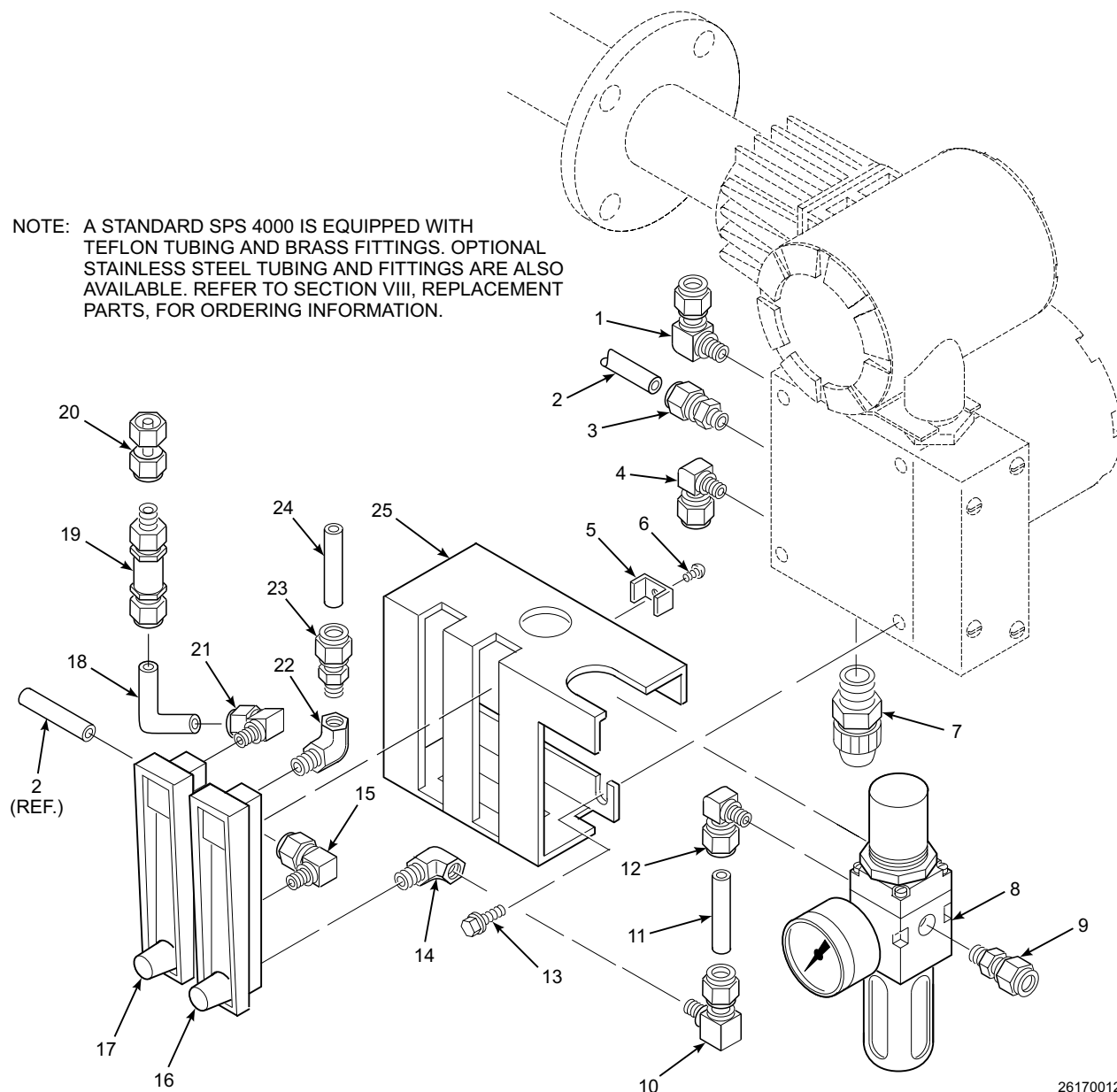
For calibration gas flowmeter (17), remove elbow fittings (15 and 21).

9. Apply pipe thread sealant to the threads of top fittings (22 or 21) and bottom fittings (14 or 15) and install fittings into new flowmeter (16 or 17).
10. Position flowmeter (16 or 17) into flowmeter bracket (25) and secure with bracket (5) and screw (6).
11. For reference air flowmeter (16), connect tubing (11) to elbow fitting (10) and install pressure regulator (9). Also, connect tubing (24) to straight fitting (23).

For calibration gas flowmeter (17), connect tubing (2) to elbow fitting (15) and connect tubing (18) to elbow fitting (21).

12. Slide the top slots of flowmeter bracket (25) onto screws (13). Flex the bottom of the bracket downward and toward the manifold to engage the bottom bracket slots and screws. Tighten screws.
13. Turn on the calibration gases at the cylinders.

NOTE: A STANDARD SPS 4000 IS EQUIPPED WITH TEFLON TUBING AND BRASS FITTINGS. OPTIONAL STAINLESS STEEL TUBING AND FITTINGS ARE ALSO AVAILABLE. REFER TO SECTION VIII, REPLACEMENT PARTS, FOR ORDERING INFORMATION.



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- | | | |
|--|--|-------------------------------------|
| 1. Elbow Fitting | 9. Straight Fitting (Optional) | 18. Tubing |
| 2. Tubing | 10. Elbow Fitting (Optional) | 19. Check Valve |
| 3. Straight Fitting | 11. Tubing (Optional) | 20. Flare Fitting |
| 4. Elbow Fitting | 12. Elbow Fitting (Optional) | 21. Elbow Fitting |
| 5. Bracket | 13. Screw | 22. Elbow Street Fitting (Optional) |
| 6. Screw | 14. Elbow Street Fitting (Optional) | 23. Straight Fitting (Optional) |
| 7. Conduit Fitting | 15. Elbow Fitting | 24. Tubing |
| 8. Reference Air Pressure Regulator (Optional) | 16. Reference Air Flowmeter (Optional) | 25. Flowmeter Bracket |
| | 17. Calibration Gas Flowmeter | |

Figure 6-13. Calibration Gas and Reference Air Components

SECTION VII. HART/AMS

7-1. OVERVIEW. The HART Communicator is a handheld communications interface device. It provides a common communications link to all microprocessor-based instruments that are HART compatible. The handheld communicator contains an 8×21 character liquid crystal display (LCD) and 25 keys. A pocket-sized manual, included with the HART Communicator, details the specific functions of all the keys.

To interface with the Oxymitter 4000, the HART Communicator requires a termination point along the 4-20 mA current loop and a minimum load resistance of 250 ohms between the communicator and the power supply. The HART Communicator accomplishes its task using a frequency shift keying (FSK) technique. With the use of FSK, high-frequency digital communication signals are superimposed on the 4-20 mA Oxymitter 4000 current loop. The communicator does not disturb the 4-20 mA signal since no net energy is added to the loop.

The HART Communicator may be interfaced with a personal computer (PC), providing special software has been installed. To connect the HART Communicator to a PC, an interface adapter is required. Refer to the proper HART Communicator documentation in regard to the PC interface option.

7-2. HART COMMUNICATOR SIGNAL LINE CONNECTIONS. The HART Communicator can connect to the Oxymitter 4000 analog output signal line at any wiring termination in the 4-20 mA current loop. There are two methods of connecting the HART Communicator to the signal line. For applications in which the signal line has a load resistance of 250 ohms or more, refer to method 1. For applications in which the signal line load resistance is less than 250 ohms, refer to method 2.

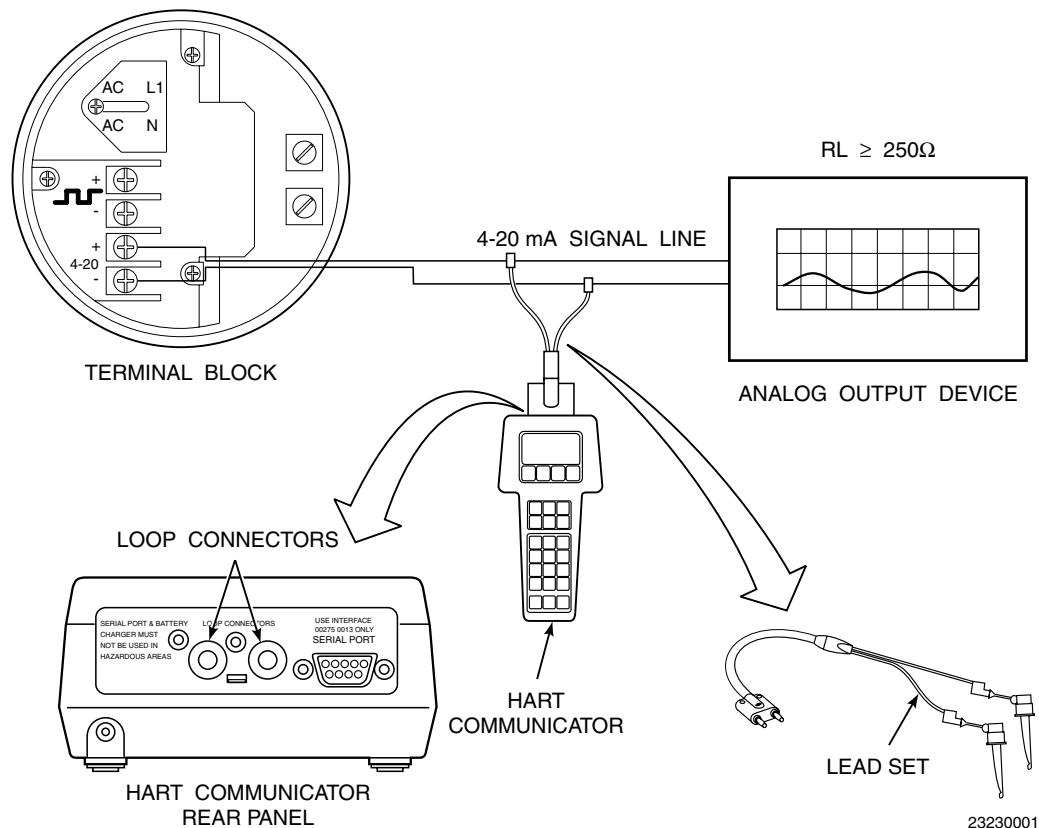


Figure 7-1. Signal Line Connections, ≥ 250 Ohms Lead Resistance

a. **Method 1, For Load Resistance > 250 Ohms.**

Refer to Figure 7-1 and the following steps to connect the HART Communicator to a signal line 250 ohms or more of load resistance.

WARNING

Explosions can result in death or serious injury. Do not make connections to the HART Communicator's serial port, 4-20 mV signal line, or NiCad recharger jack in an explosive atmosphere.

Using the supplied lead set, connect the HART Communicator in parallel to the Oxymitter 4000. Use any wiring termination points in the analog output 4-20 mA signal line.

b. **Method 2, For Load Resistance < 250 Ohms.**

Refer to Figure 7-2 and the following steps to connect the HART Communicator to a signal line with less than 250 ohms load resistance.

WARNING

Explosions can result in death or serious injury. Do not make connections to the HART Communicator's serial port, 4-20 mA signal line, or NiCad recharger jack in an explosive atmosphere.

1. At a convenient point, break the analog output 4-20 mA signal line and install the optional 250 ohm load resistor.
2. Plug the load resistor into the loop connectors (located on the rear panel of the HART Communicator).

7-3. HART COMMUNICATOR PC CONNECTIONS.

There is an option to interface the HART Communicator with a personal computer. Load the designated AMS software into the PC. Then link the HART Communicator to the PC using the interface PC adapter that connects to the serial port (on the communicator rear panel).

Refer to the proper HART Communicator documentation in regard to the PC interface option.

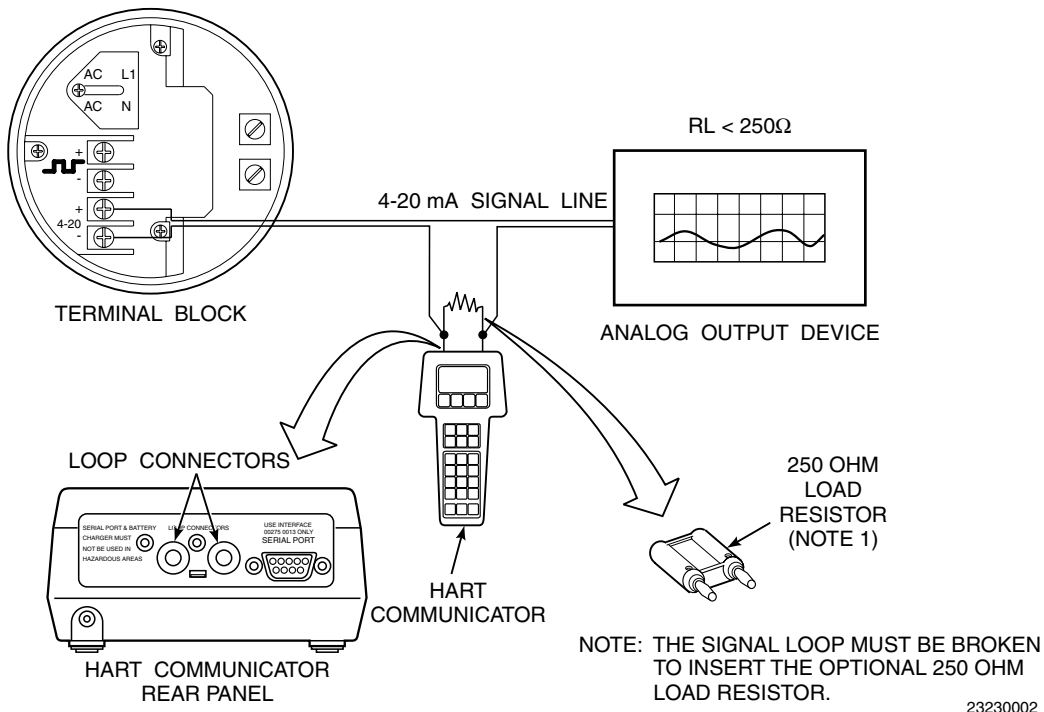


Figure 7-2. Signal Line Connections, < 250 Ohms Load Resistance

7-4. OFF-LINE AND ON-LINE OPERATIONS. The HART Communicator can be operated both off-line and on-line.

- a. Off-line operations are those in which the communicator is not connected to the Oxymitter 4000. Off-line operations can include interfacing the HART Communicator with a PC (refer to applicable HART documentation regarding HART/PC applications).
- b. In the on-line mode, the communicator is connected to the 4-20 mA analog output signal line. The communicator is connected in parallel to the Oxymitter 4000 or in parallel to the 250 ohm load resistor.

NOTE

If the HART Communicator is turned on while connected to the 4-20 mA analog output signal line, an undefined status indication appears while the communicator warms up. Wait until the warmup period ends to continue.

- c. The opening menu displayed on the LCD is different for on-line and off-line operations. When powering up a disconnected (off-line) communicator, the LCD will display the Main Menu. When powering up a connected (on-line) communicator, the LCD will display the On-line Menu. Refer to the HART Communicator manual for detailed menu information.

7-5. LOGIC I/O CONFIGURATIONS. The Oxymitter 4000 logic I/O output can be configured for ten different modes through HART/AMS. The factory default condition is Mode 5. A list of possible configurations appear in Table 7-1.

The Unit Alarm configuration available for Modes 1, 3, 5, and 7 refers to the diagnostic alarm faults in Table 5-1.

7-6. MENU TREE FOR HART COMMUNICATOR/OXYMITTER 4000 APPLICATIONS. This section consists of a menu tree for the HART Communicator. This menu is specific to Oxymitter 4000 applications.

Table 7-1. Logic I/O Configuration.

Mode	Configuration
0	The unit is not configured for any alarm condition.
1	The unit is configured for a Unit Alarm.
2	The unit is configured for Low O ₂ .
3	The unit is configured for both a Unit Alarm and Low O ₂ .
4	The unit is configured for a High AC Impedance/CALIBRATION RECOMMENDED.
5*	The unit is configured for both a Unit Alarm and a High AC Impedance/CALIBRATION RECOMMENDED.
6	The unit is configured for both a Low O ₂ and High AC Impedance/CALIBRATION RECOMMENDED.
7	The unit is configured for a Unit Alarm, a Low O ₂ , and a High AC Impedance/CALIBRATION RECOMMENDED.
8**	The unit is configured for a calibration handshake with IMPS 4000 or SPS 4000. CALIBRATION RECOMMENDED will initiate the calibration cycle.
9	The unit is configured for a calibration handshake. CALIBRATION RECOMMENDED will not initiate the calibration cycle with the IMPS 4000 or SPS 4000.

*The default condition for an Oxymitter 4000 without an IMPS 4000 or SPS 4000.

**The default condition for an Oxymitter 4000 with an IMPS 4000 or SPS 4000.

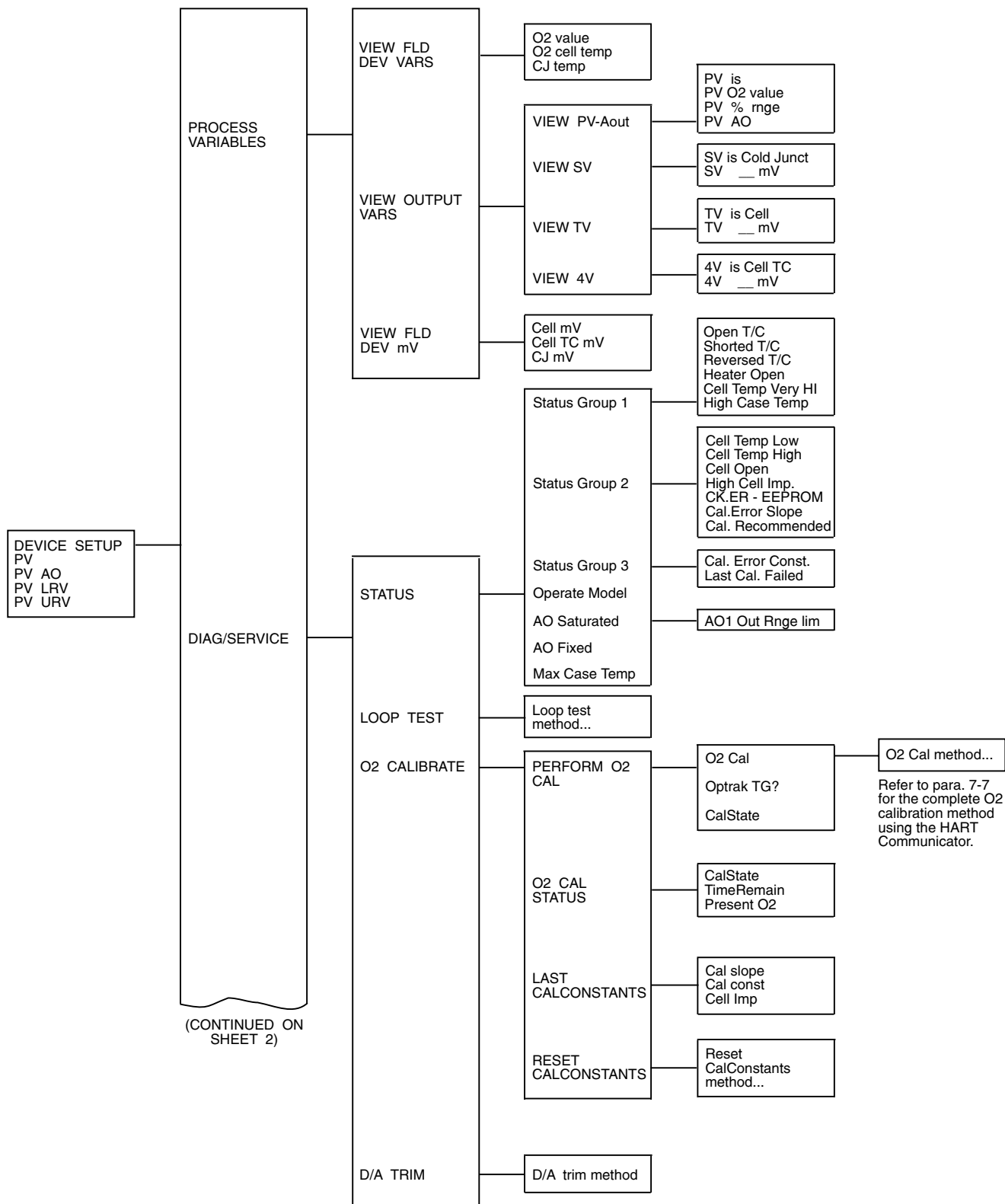
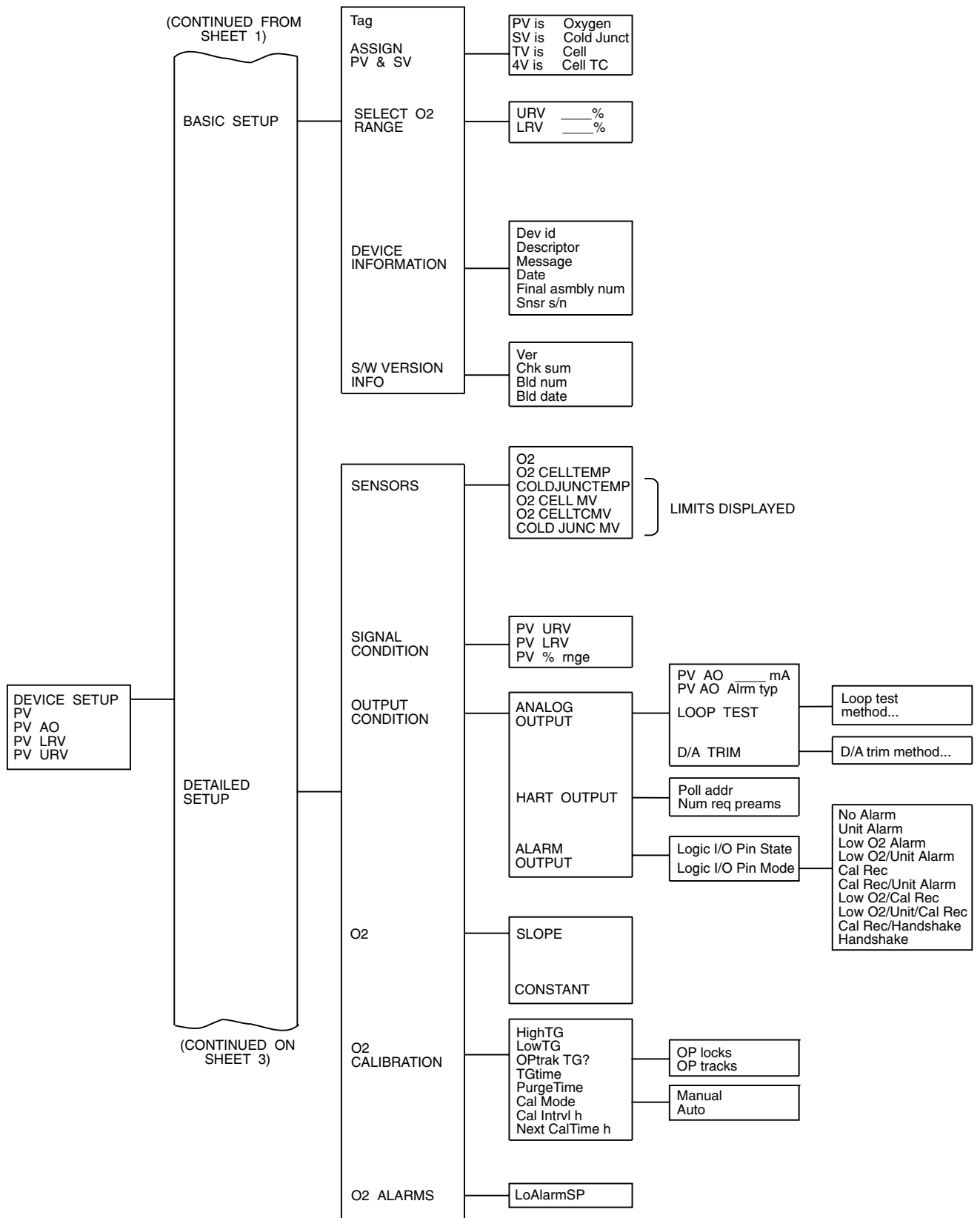


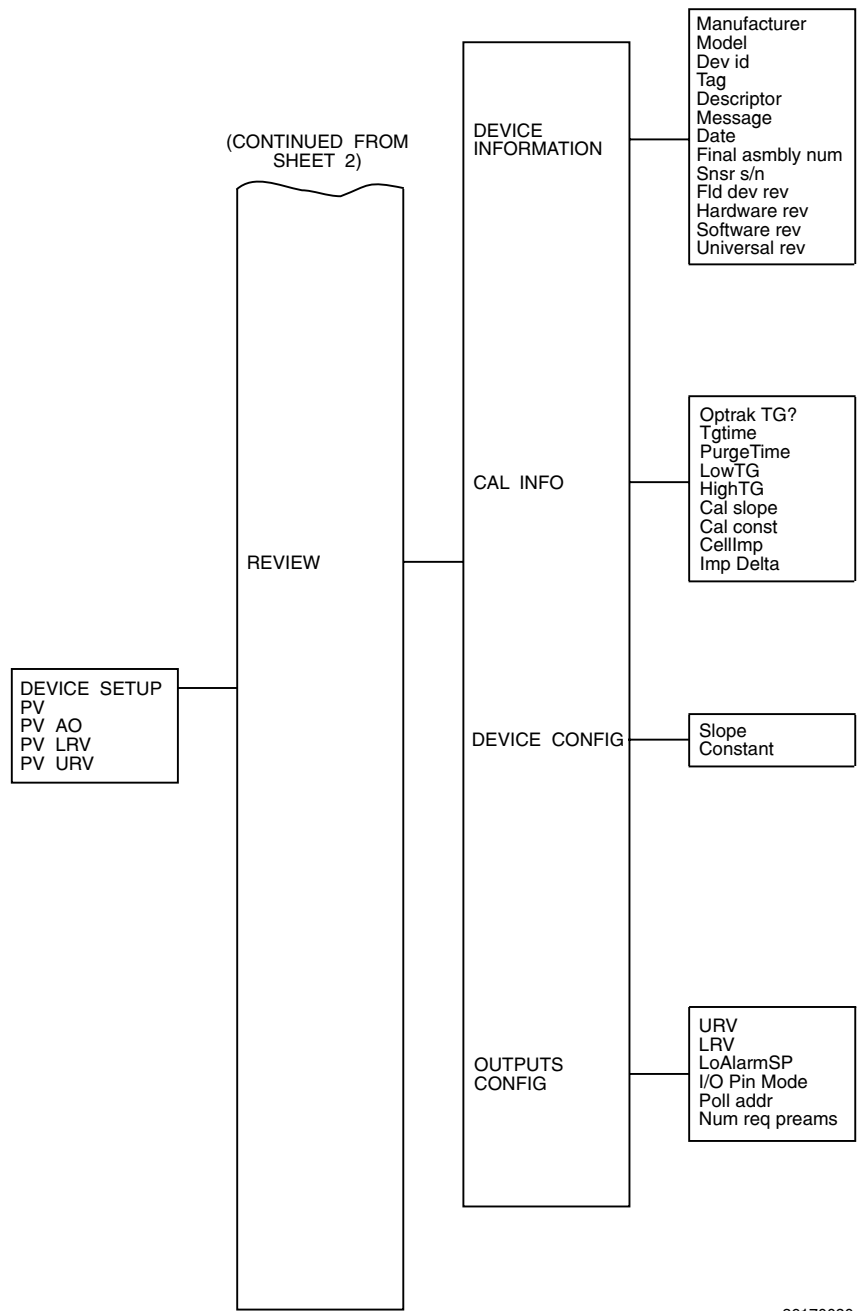
Figure 7-3. Menu Tree for HART/AMS on the Oxymitter 4000 (Sheet 1 of 3)

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Figure 7-3. Menu Tree for HART/AMS on the Oxymitter 4000 (Sheet 2 of 3)



26170030

Figure 7-3. Menu Tree for HART/AMS on the Oxymitter 4000 (Sheet 3 of 3)

7-7. HART COMMUNICATOR O2 CAL METHOD.

To perform a calibration using the HART Communicator, use the following procedure. If necessary, use the menu tree in Figure 7-3 (sheet 1 of 3) for reference.

NOTE

To select a menu item, either use the up and down arrow keys to scroll to the menu item and press the right arrow key or use the number keypad to select the menu item number.

To return to a preceding menu, press the left arrow key.

- a. From the PERFORM O2 CAL screen, select menu item 1, O2 CAL, to access the O2 calibration procedure.

WARNING

Failure to remove the Oxymitter 4000 from automatic control loops prior to performing this procedure may result in a dangerous operating condition.

- b. In the first O2 CAL screen, a “Loop should be removed from automatic control” warning appears. Remove the Oxymitter 4000 from any automatic control loops to avoid a potentially dangerous operating condition and press OK.
- c. The next several screens indicate the calibration status. At each of the following status prompts, select menu item 2, NEXT CAL STEP:

COMPLETE
CAL RECOMMENDED
APPLY GAS 1
GAS 1 FLOW

- d. At this point, select menu item 4, EXIT, to leave the O2 CAL procedure.
- e. From the PERFORM O2 CAL screen, view menu item 3, CALSTATE, to monitor the calibration status as it updates. Or, access the O2 CALIBRATE screen and select menu item 2, O2

CAL STATUS, to view menu item 1, CALSTATE; menu item 2, TIMEREMAIN; and menu item 3, PRESENT O2, as the calibration status updates.

- f. When CALSTATE displays APPLY GAS 2, return to the O2 CAL procedure.
- g. When the “Loop should be removed from automatic control” warning appears, press OK.
- h. At the APPLY GAS 2 status prompt, select menu item 2, NEXT CAL STEP. When the status displays GAS 2 FLOW, select menu item 4, EXIT, to leave the O2 CAL procedure.
- i. From the PERFORM O2 CAL screen, view menu item 3, CALSTATE, to monitor the calibration status as it updates. Or, access the O2 CALIBRATE screen and select menu item 2, O2 CAL STATUS, to view menu item 1, CALSTATE; menu item 2, TIMEREMAIN; and menu item 3, PRESENT O2, as the calibration status updates.
- j. When CALSTATE displays STOP GAS, return to the O2 CAL procedure.
- k. When the “Loop should be returned to automatic control” message appears, return the Oxymitter 4000 to the automatic control loops previously removed and press OK.
- l. At the STOP GAS status prompt, select menu item 2, NEXT CAL STEP. When the status displays PURGING, select menu item 4, EXIT, to leave the O2 CAL procedure.
- m. From the PERFORM O2 CAL screen, view menu item 3, CALSTATE, to monitor the calibration status as it updates. Or, access the O2 CALIBRATE screen and select menu item 2, O2 CAL STATUS, to view menu item 1, CALSTATE; menu item 2, TIMEREMAIN; and menu item 3, PRESENT O2, as the calibration status updates.
- n. When CALSTATE displays COMPLETE, the calibration is finished.

- 7-8. DEFINING A TIMED CALIBRATION VIA HART.** Use the following procedure to specify a time interval (in hours) at which the Oxymitter 4000 will be automatically calibrated.

NOTE

To select a menu item, either use the up and down arrow keys to scroll to the menu item and press the right arrow key or use the number keypad to select the menu item number.

To return to a preceding menu, press the left arrow key.

- a.** From the DEVICE SETUP screen, select DETAILED SETUP.
- b.** From the DETAILED SETUP screen, select O2 CALIBRATION.
- c.** From the O2 CALIBRATION screen, select menu item 6, CAL MODE. Set the CAL MODE to AUTO.
- d.** Return to the O2 CALIBRATION screen and select menu item 7, CAL INTRVL.
- e.** At the prompt, input a time interval (in hours) at which an automatic calibration will occur and press ENTER.

SECTION VIII. REPLACEMENT PARTS

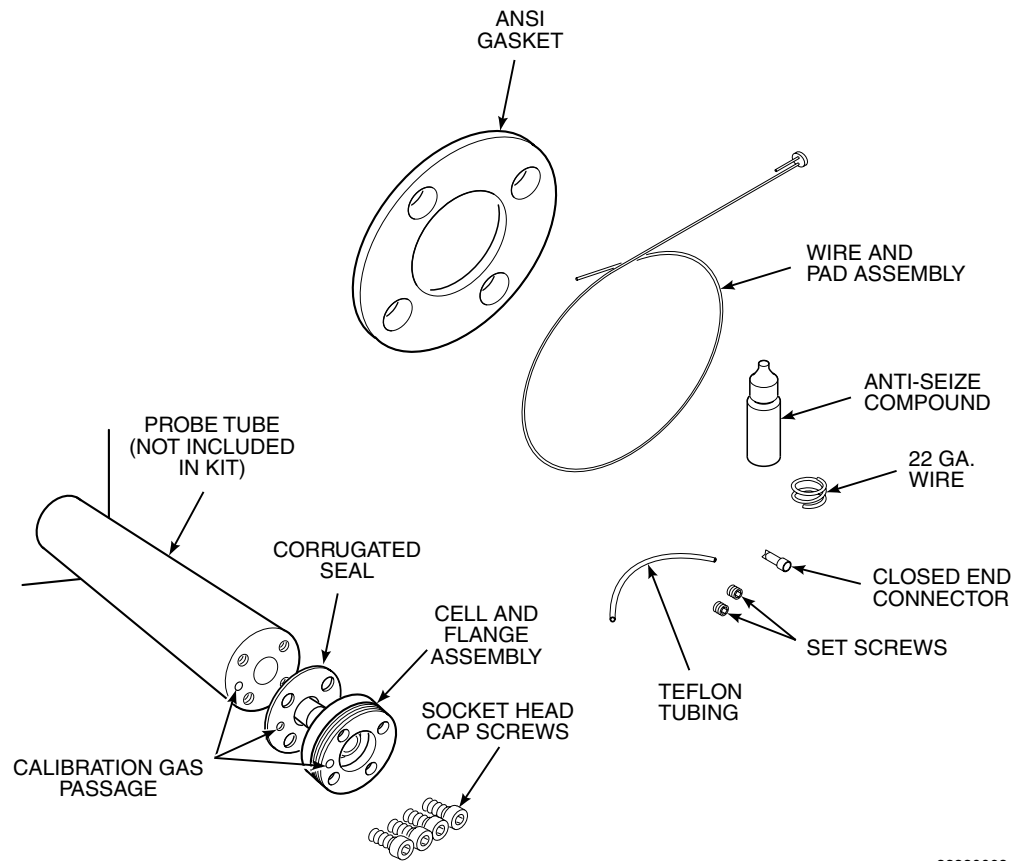
Table 8-1. Replacement Parts for Probe.

FIGURE and INDEX No.	PART NUMBER		DESCRIPTION
	No Dust Seal	Dust Seal	
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G01	3D39649G01	18" ANSI Probe with Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G02	3D39649G02	3' ANSI Probe with Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G03	3D39649G03	6' ANSI Probe with Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G04	3D39649G04	9' ANSI Probe with Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G05	3D39649G05	12' ANSI Probe with Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G06	3D39649G06	18" JIS Probe with Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G07	3D39649G07	3' JIS Probe with Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G08	3D39649G08	6' JIS Probe with Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G09	3D39649G09	9' JIS Probe with Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G10	3D39649G10	12' JIS Probe with Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G11	3D39649G11	18" DIN Probe with Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G12	3D39649G12	3' DIN Probe with Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G13	3D39649G13	6' DIN Probe with Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G14	3D39649G14	9' DIN Probe with Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G15	3D39649G15	12' DIN Probe with Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G17	3D39649G17	18" ANSI Probe with Flame Arrestor and Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G18	3D39649G18	3' ANSI Probe with Flame Arrestor and Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G19	3D39649G19	6' ANSI Probe with Flame Arrestor and Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G20	3D39649G20	9' ANSI Probe with Flame Arrestor and Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G21	3D39649G21	12' ANSI Probe with Flame Arrestor and Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G22	3D39649G22	18" JIS Probe with Flame Arrestor and Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G23	3D39649G23	3' JIS Probe with Flame Arrestor and Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G24	3D39649G24	6' JIS Probe with Flame Arrestor and Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G25	3D39649G25	9' JIS Probe with Flame Arrestor and Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G26	3D39649G26	12' JIS Probe with Flame Arrestor and Ceramic Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G27	3D39649G27	18" DIN Probe with Flame Arrestor and Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G28	3D39649G28	3' DIN Probe with Flame Arrestor and Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G29	3D39649G29	6' DIN Probe with Flame Arrestor and Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G30	3D39649G30	9' DIN Probe with Flame Arrestor and Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G31	3D39649G31	12' DIN Probe with Flame Arrestor and Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G33	3D39649G33	18" ANSI Probe with Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G34	3D39649G34	3' ANSI Probe with Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G35	3D39649G35	6' ANSI Probe with Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G36	3D39649G36	9' ANSI Probe with Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G37	3D39649G37	12' ANSI Probe with Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G38	3D39649G38	18" JIS Probe with Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G39	3D39649G39	3' JIS Probe with Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G40	3D39649G40	6' JIS Probe with Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G41	3D39649G41	9' JIS Probe with Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G42	3D39649G42	12' JIS Probe with Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G43	3D39649G43	18" DIN Probe with Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G44	3D39649G44	3' DIN Probe with Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G45	3D39649G45	6' DIN Probe with Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G46	3D39649G46	9' DIN Probe with Snubber Diffuser
6-1, 1 thru 6, 8, 9, 28 thru 31	3D39648G47	3D39649G47	12' DIN Probe with Snubber Diffuser

Table 8-1. Replacement Parts for Probe (Continued).

FIGURE and INDEX No.	PART NUMBER	DESCRIPTION
6-1, 6	3D39644G01	18" ANSI Probe Tube Assy.
6-1, 6	3D39644G02	3' ANSI Probe Tube Assy.
6-1, 6	3D39644G03	6' ANSI Probe Tube Assy.
6-1, 6	3D39644G04	9' ANSI Probe Tube Assy.
6-1, 6	3D39644G05	12' ANSI Probe Tube Assy.
6-1, 6	3D39644G06	18" JIS Probe Tube Assy.
6-1, 6	3D39644G07	3' JIS Probe Tube Assy.
6-1, 6	3D39644G08	6' JIS Probe Tube Assy.
6-1, 6	3D39644G09	9' JIS Probe Tube Assy.
6-1, 6	3D39644G10	12' JIS Probe Tube Assy.
6-1, 6	3D39644G11	18" DIN Probe Tube Assy.
6-1, 6	3D39644G12	3' DIN Probe Tube Assy.
6-1, 6	3D39644G13	6' DIN Probe Tube Assy.
6-1, 6	3D39644G14	9' DIN Probe Tube Assy.
6-1, 6	3D39644G15	12' DIN Probe Tube Assy.
6-1, 1	3D39645G01	18" Heater Strut Assy.
6-1, 1	3D39645G02	3' Heater Strut Assy.
6-1, 1	3D39645G03	6' Heater Strut Assy.
6-1, 1	3D39645G04	9' Heater Strut Assy.
6-1, 1	3D39645G05	12' Heater Strut Assy.
8-1	4847B61G02	ANSI 18" Cell Replacement Kit*
8-1	4847B61G03	ANSI 3' Cell Replacement Kit*
8-1	4847B61G04	ANSI 6' Cell Replacement Kit*
8-1	4847B61G05	ANSI 9' Cell Replacement Kit*
8-1	4847B61G06	ANSI 12' Cell Replacement Kit*
8-1	4847B61G08	JIS 18" Cell Replacement Kit*
8-1	4847B61G09	JIS 3' Cell Replacement Kit*
8-1	4847B61G10	JIS 6' Cell Replacement Kit*
8-1	4847B61G11	JIS 9' Cell Replacement Kit*
8-1	4847B61G12	JIS 12' Cell Replacement Kit*
8-1	4847B61G14	DIN 18" Cell Replacement Kit*
8-1	4847B61G15	DIN 3' Cell Replacement Kit*
8-1	4847B61G16	DIN 6' Cell Replacement Kit*
8-1	4847B61G17	DIN 9' Cell Replacement Kit*
8-1	4847B61G18	DIN 12' Cell Replacement Kit*
2-3	3D39003G01	ANSI 3' Abrasive Shield Assy.
2-3	3D39003G02	ANSI 6' Abrasive Shield Assy.
2-3	3D39003G03	JIS 3' Abrasive Shield Assy.
2-3	3D39003G04	JIS 6' Abrasive Shield Assy.
2-3	3D39003G05	DIN 3' Abrasive Shield Assy.
2-3	3D39003G06	DIN 6' Abrasive Shield Assy.
2-3	3D39003G07	ANSI 9' Abrasive Shield Assy.
2-3	3D39003G08	ANSI 12' Abrasive Shield Assy.

*Includes pad and wire.



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Figure 8-1. Cell Replacement Kit

Table 8-1. Replacement Parts for Probe (Continued).

FIGURE and INDEX No.	PART NUMBER	DESCRIPTION
2-3	3D39003G09	JIS 9' Abrasive Shield Assy.
2-3	3D39003G10	JIS 12' Abrasive Shield Assy.
2-3	3D39003G11	DIN 9' Abrasive Shield Assy.
2-3	3D39003G12	DIN 12' Abrasive Shield Assy.
2-3	3D39003G13	ANSI 18" Abrasive Shield Assy.
2-3	3D39003G14	JIS 18" Abrasive Shield Assy.
2-3	3D39003G15	DIN 18" Abrasive Shield Assy.
2-1	3535B60G01	Ceramic Diffuser with Dust Seal
2-1	3535B63G01	Flame Arrest Ceramic Diffuser with Dust Seal
2-1	4843B38G02	Snubber Diffuser with Dust Seal
2-1	3534B18G01	Ceramic Diffuser Hub Assy.
2-1	3534B48G01	Vee Deflector Assy.
	4845B27G01	Stainless Steel Diffusion Assy., 5 microns
	4845B27G02	Stainless Steel Diffusion Assy., 40 microns
	4845B27G03	Stainless Steel Diffusion Assy., 100 microns
	4845B27G04	Stainless Steel Diffusion Assy. with dust seal hub, 5 microns
	4845B27G05	Stainless Steel Diffusion Assy. with dust seal hub, 40 microns
	4845B27G06	Stainless Steel Diffusion Assy. with dust seal hub, 100 microns
6-1, 2	4843B37G01	Snubber Diffusion Assy.
8-2	3535B42G02	Probe Disassembly Kit

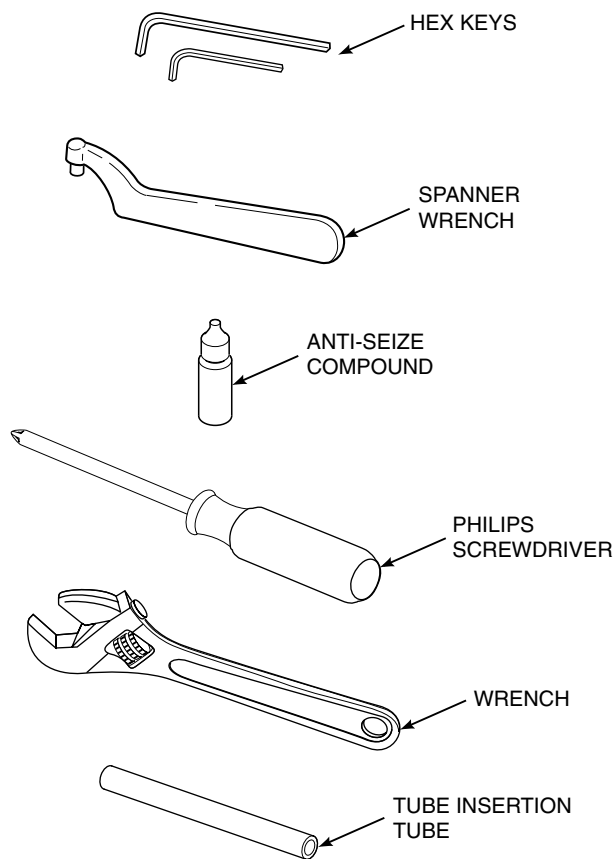


Figure 8-2. Probe Disassembly Kit

Table 8-2. Replacement Parts for Electronics.

FIGURE and INDEX No.	PART NUMBER	DESCRIPTION
6-1, 21, 27	4850B10G01	Electronics English-Standard
6-1, 12	4849B95G01	Housing and Cover
6-1, 25	3D39777G02	Electronic Assembly and keypad English
6-1, 11	08732-0002-0001	Termination Block-Standard
	5R10145G01	Cover
6-1, 21, 27	4850B10G02	Electronics German-Standard
6-1, 12	4849B95G01	Housing and Cover
6-1, 25	3D39777G03	Electronic Assembly and keypad German
6-1, 11	08732-0002-0001	Termination Block-Standard
	5R10145G01	Cover
6-1, 21, 27	4850B10G03	Electronics French-Standard
6-1, 12	4849B95G01	Housing and Cover
6-1, 25	3D39777G04	Electronic Assembly and keypad French
6-1, 11	08732-0002-0001	Termination Block-Standard
	5R10145G01	Cover
6-1, 21, 27	4850B10G04	Electronics Spanish-Standard
6-1, 12	4849B95G01	Housing and Cover
6-1, 25	3D39777G05	Electronic Assembly and keypad Spanish
6-1, 11	08732-0002-0001	Termination Block-Standard
	5R10145G01	Cover
6-1, 21, 27	4850B10G05	Electronics Italian-Standard
6-1, 12	4849B95G01	Housing and Cover
6-1, 25	3D39777G06	Electronic Assembly and keypad Italian
6-1, 11	08732-0002-0001	Termination Block-Standard
	5R10145G01	Cover
6-1, 21	4850B10G06	Electronics English-Transient Protected
6-1, 12	4849B95G01	Housing
6-1, 25	3D39777G02	Electronic Assembly and keypad English
6-1, 11	08732-0002-0002	Termination Block-Transient Protected
	5R10145G01	Cover
6-1, 21	4850B10G07	Electronics German-Transient Protected
6-1, 12	4849B95G01	Housing
6-1, 25	3D39777G03	Electronic Assembly and keypad German
6-1, 11	08732-0002-0002	Termination Block-Transient Protected
	5R10145G01	Cover
6-1, 21	4850B10G08	Electronics French-Transient Protected
6-1, 12	4849B95G01	Housing
6-1, 25	3D39777G04	Electronic Assembly and keypad French
6-1, 11	08732-0002-0002	Termination Block-Transient Protected
	5R10145G01	Cover

Table 8-2. Replacement Parts for Electronics (Continued).

FIGURE and INDEX No.	PART NUMBER	DESCRIPTION
6-1, 21	4850B10G09	Electronics Spanish-Transient Protected
6-1, 12	4849B95G01	Housing
6-1, 25	3D39777G05	Electronic Assembly and keypad Spanish
6-1, 11	08732-0002-0002	Termination Block-Transient Protected
	5R10145G01	Cover
	4850B10G10	Electronics Italian-Transient Protected
6-1, 21	4849B95G01	Housing
6-1, 12	3D39777G06	Electronic Assembly and keypad Italian
6-1, 25	08732-0002-0002	Termination Block-Transient Protected
6-1, 11	5R10145G01	Cover
6-1, 12	3D39777G01	Electronic Assembly
6-1, 14	4849B72H01	Membrane Keypad English
6-1, 14	4849B72H02	Membrane Keypad German
6-1, 14	4849B72H03	Membrane Keypad French
6-1, 14	4849B72H04	Membrane Keypad Spanish
6-1, 14	4849B72H05	Membrane Keypad Italian
6-1, 25	08732-0002-0001	Termination Block Standard
6-1, 25	08732-0002-0002	Termination Block Transient Protected

Table 8-3. Replacement Parts for SPS 4000.

FIGURE and INDEX No.	PART NUMBER	DESCRIPTION
6-11, 4	1A99093H01	Bushing Gasket
6-13, 19	6292A97H03	Check Valve
6-11, 15	1A99089H01	Cover O-ring
6-13, 17	771B635H01	Flowmeter Assembly, Calibration Gas
6-13, 16	771B635H02	Flowmeter Assembly, Reference Air (Optional)
6-13, 8	1A99094H01	Pressure Regulator, Reference Air (Optional)
6-11, 17	1A97913H03	Fuse, 5A, 250V, 5 × 20 mm, Slow Blow
6-11, 19	4850B56G01	Interface Board
6-11, 18	4850B54G01	Power Supply Board
6-11, 12	7305A67H01	Pressure Switch
6-11, 13 and 20	1A97905H01	Solenoid
6-11, 8	120039-0077	O-ring
6-11, 28	4850B75H01	Terminal Cover Gasket
6-11, 25	1A99147H01	Terminal Strip

Table 8-4. Replacement Parts for Calibration Components.

FIGURE and INDEX No.	PART NUMBER	DESCRIPTION
	1A99119G01	Calibration Gas Bottles — 0.4% and 8% O ₂ , balance nitrogen — 550 liters each, includes bottle rack*
	1A99119G02	Two Flow Regulators (for calibration gas bottles)

*Calibration gas bottles cannot be shipped via airfreight.

SECTION IX. RETURNING EQUIPMENT TO THE FACTORY

9-1. If factory repair of defective equipment is required, proceed as follows:

- a.** Secure a return authorization number from a Rosemount Analytical Sales Office or representative before returning the equipment. Equipment must be returned with complete identification in accordance with Rosemount instructions or it will not be accepted.

In no event will Rosemount be responsible for equipment returned without proper authorization and identification.

- b.** Carefully pack defective unit in a sturdy box with sufficient shock absorbing material to ensure that no additional damage will occur during shipping.
- c.** In a cover letter, describe completely:
 - 1. The symptoms from which it was determined that the equipment is faulty.
 - 2. The environment in which the equipment has been operating (housing, weather, vibration, dust, etc.).
 - 3. Site from which equipment was removed.
 - 4. Whether warranty or nonwarranty service is requested.
 - 5. Complete shipping instructions for return of equipment.
 - 6. Reference the return authorization number.

- d.** Enclose a cover letter and purchase order and ship the defective equipment according to instructions provided in Rosemount Return Authorization, prepaid, to:

Rosemount Analytical Inc.
RMR Department
1201 N. Main Street
Orrville, Ohio 44667

If warranty service is requested, the defective unit will be carefully inspected and tested at the factory. If failure was due to conditions listed in the standard Rosemount warranty, the defective unit will be repaired or replaced at Rosemount's option, and an operating unit will be returned to the customer in accordance with shipping instructions furnished in the cover letter.

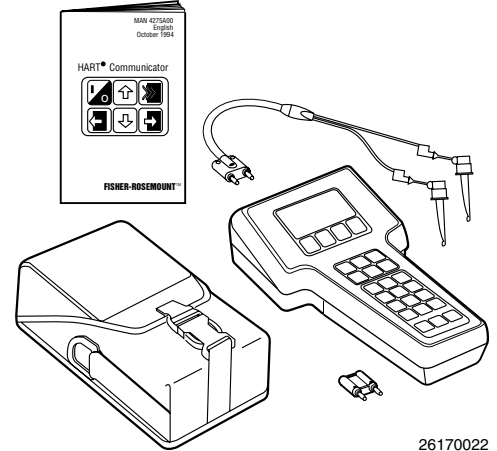
For equipment no longer under warranty, the equipment will be repaired at the factory and returned as directed by the purchase order and shipping instructions.

SECTION X. OPTIONAL ACCESSORIES

HART HANDHELD 275 COMMUNICATOR

The HART Handheld 275 Communicator is an interface device that provides a common communication link to HART-compatible instruments, such as the Oxymitter 4000. HART Communications Protocol permits all the information available from the Oxymitter 4000's electronics to be transmitted over standard 4-20 mA signal wires. By attaching the HART handheld communicator at a termination point along the 4-20 mA signal line, a technician can diagnose problems and configure and calibrate the Oxymitter 4000 as if he or she were standing in front of the instrument.

For more information, call Rosemount Analytical at 1-800-433-6076.



ASSET MANAGEMENT SOLUTIONS (AMS)

Asset Management Solutions (AMS) software works in conjunction with the HART Communication Protocol and offers the capability to communicate with all HART plant devices from a single computer terminal.

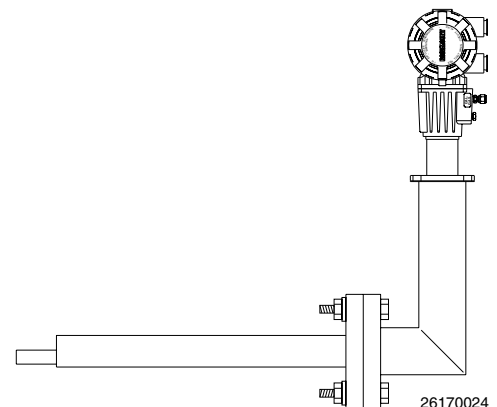
For more information, call Rosemount Analytical at 1-800-433-6076.



BY-PASS PACKAGES

The specially designed Rosemount Analytical By-Pass Package for oxygen analyzers has proven to withstand the high temperatures in process heaters while providing the same advantages offered by the in situ sensor. Inconel or Kanthal steel tubes provide effective resistance to corrosion, and the package uses no moving parts, air pumps, or other components common to other sampling systems.

For more information, call Rosemount Analytical at 1-800-433-6076.

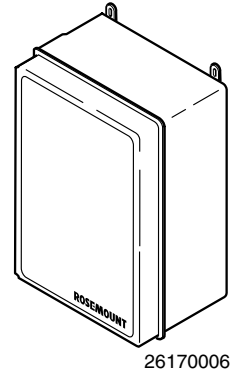


IMPS 4000 INTELLIGENT MULTIPROBE TEST GAS SEQUENCER

The IMPS 4000 Intelligent Multiprobe Test Gas Sequencer is housed within an IP56 (NEMA 4X) enclosure and has the intelligence to provide calibration gas sequencing of up to four Oxymitter 4000 units to accommodate automatic and semi-automatic calibration routines.

This sequencer works in conjunction with the Oxymitter 4000 CALIBRATION RECOMMENDED feature, eliminating out-of-calibration occurrences and the need to send a technician to the installation site. In addition, the SPS 4000 provides a remote contact input to initiate a calibration from a remote location and relay outputs to alert when a calibration is in progress, an Oxymitter 4000 is out of calibration, calibration gases are on, and calibration gas pressure is low.

For more information, call Rosemount Analytical at 1-800-433-6076.

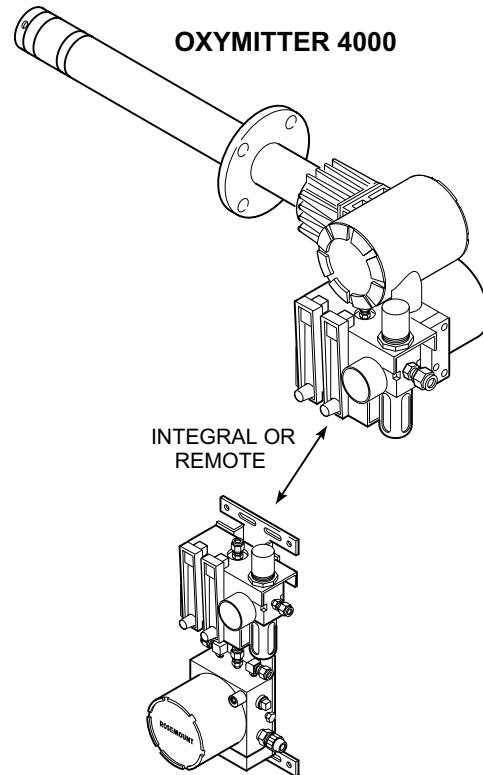


SPS 4000 SINGLE PROBE AUTOCALIBRATION SEQUENCER

Rosemount Analytical specifically designed the SPS 4000 Single Probe Autocalibration Sequencer to provide the capability to perform automatic or on-demand Oxymitter 4000 calibrations. The system can be installed either as an integral component to an Oxymitter 4000 or at a remote location if space is limited or corrosive conditions exist at the installation site.

The SPS 4000 works in conjunction with the Oxymitter 4000's CALIBRATION RECOMMENDED feature, eliminating out-of-calibration occurrences and the need to send a technician to the installation site. In addition, the SPS 4000 provides a remote contact input to initiate a calibration from a remote location and relay outputs to indicate when a calibration is in progress or the Oxymitter 4000 is out of calibration.

For more information, call Rosemount Analytical at 1-800-433-6076.

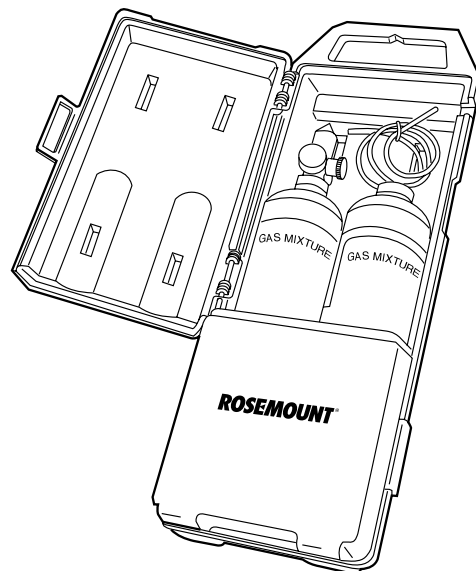


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O₂ CALIBRATION GAS KITS

Rosemount Analytical's O₂ Calibration Gas and Service Kits have been carefully designed to provide a more convenient and fully portable means of testing, calibrating, and servicing Rosemount Analytical's oxygen analyzers. These lightweight, disposable gas cylinders eliminate the need to rent gas bottles.

For more information, call Rosemount Analytical at 1-800-433-6076.



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This index is an alphabetized listing of parts, terms, and procedures related to the Oxymitter 4000 Oxygen Transmitter. Every item listed in the index refers to a location in the manual by page number or numbers.

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